EFFECTS OF THE ALLOCATION OF REWARD AND ITS MAGNITUDE ON INTRINSIC MOTIVATION AND PERCEIVED COMPETENCE: A Laboratory Study

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ABSTRACT

This study was designed to examined the interactive effects of reward contingencies and sizes of reward upon intrinsic motivation and perceived task competence. Three levels of reward contingency were used: task-noncontingent reward, task-contingent reward and performance-contingent reward, with two sizes of reward within each condition. It was hypothesized, following the Cognitive evaluation theory (Deci, Cascio and Krusell, 1975) that the interaction between allocation of reward and magnitude of reward would have significant effects on perceived intrinsic motivation and task competence; that there would be a significant relationship between the subjects' intrinsic motivation and perceived competence in the performance-contingent reward condition, but no significant relations would be found on the other two conditions. Partial support was provided for these hypotheses. Both allocation of reward and magnitude of reward were found to have significant interactive effects on intrinsic motivation and perceived competence. There were no significant relationships between intrinsic motivation and perceived competence in any of the experimental conditions. Further analysis indicated that significant differences existed between task-noncontingent rewards ($5.00 & $1.70), task-contingent rewards (8 cents per problem/ 30 & 10 minutes), performance-contingent rewards ($5.00/above average) and performance-contingent reward ($1.70/below average). Sex differences within each experimental group were not significant.

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INTRODUCTION

Thinking is easy, acting is difficult, and to put one's thoughts into action is the most difficult thing in the world.

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Motivation is a popular topic that relates directly to all of us. It is a topic about which many people claim to have some degree of knowledge. Motivation is a keyword in virtually all work settings and educational institutions. Why do people work ? How do they perform those activities called work ? Why are some people effective in certain jobs while others are not ? What can be done to make people and organizations more effective ? Few aspects of human behaviour have received as much scrutiny and have as much practical significance as the answers to these questions. In this century, approaches have varied from Frederick W. Taylor's theory of 'scientific management', which attempted to discover how to operate the human machine efficiently, to 'humanism', in which attempts were made to stimulate human potential and self-actualization.

One of the important topics in human motivation concerns the effects of incentives and other environmental events on intrinsic motivation. Since the arrival of scientific management (Taylor, 1911), piece rate payments or wage incentives have been generally used for motivating employees. Such a system ties a person's financial rewards directly to his performance, by paying him a set rate for each unit of output which he produces. The motivational assumption underlying piece rate payments is

that a person will perform effectively, to the extent that his rewards are made contingent upon effective performance.

Considerable research has detailed the processes through which external events, such as rewards can effect a person's intrinsic motivation. The experimental literature on intrinsic motivation includes a complicated set of studies on reward contingency, with results indicating negative as well as positive effects on task performance. This thesis constitutes an attempt to closely examine the effects of rewards on two motivational factors that have received much attention in recent years. These two factors are intrinsic motivation/task interest or attractiveness and perceived task competence. It should be noted that this study does not question whether rewards are good or bad, but how they can be used most effectively and how their effectiveness should be evaluated.

In this introductory chapter an attempt will be made to place the research topic in perspective and to provide the outline of the approach to the topic.

Investigations of human motivation have begun to distinguish between intrinsic and extrinsic motivation. The most commonly used definition of intrinsic motivation in the experimental literature states that behaviour is intrinsically motivated when there are no apparent external rewards (Scott, 1976). Intrinsically motivated behaviours are those that are engaged in for their own sakes rather than as a means to some end. They are activities we perform voluntarily in the absence of external rewards. In many theories of intrinsic motivation, feelings of competence or efficacy are hypothesized to be directly responsible for task interest (Bandura, 1982; Deci,

Cascio and Krusell, 1975). For example, according to Bandura (1982) : "...interest grows from satisfactions derived from fulfilling internal standards and from perceived self-efficacy gained from performance accomplishments and other sources of efficacy information" (p. 133). The role of competence is more complex in Deci's cognitive evaluation theory (Deci & Ryan, 1980), as competence must be perceived as self-determined before it can affect interest.

In Deci & Ryan's (1980) cognitive evaluation theory, external events such as rewards can affect intrinsic motivation by influencing perceptions of causality and competence. If the rewards are salient as the controlling events (events that pressure people toward specified outcomes), thereby denying the experience of choice, behaviour can be seen as extrinsically caused. As a result, intrinsic motivation decreases. In contrast, rewards that provide people with meaningful feedback/information, is useful to people's becoming more competent in the context of choice. These rewards have been shown to enhance intrinsic motivation. To Deci and Ryan, experience of choice seems to be a necessary condition for the maintenance and enhancement of intrinsic motivation.

The effects of rewards on perceived competence and intrinsic motivation, whether rewards are controlling or informational (decrease or increase intrinsic motivation) will therefore depend on the way the rewards were administered. This study is concerned with the effects of reward contingencies and sizes of reward on intrinsically interesting tasks and perceived task competence, and is also concerned with the relationship between intrinsic motivation/task interest and perceived task competence

under such conditions. From the findings of this study, Deci and Ryan's theory on perceived competence and intrinsic motivation will be discussed. It will also have implication for the effectiveness of rewards, namely, how rewards can be administered without decreasing intrinsic motivation.

There were several investigated variables in this study, namely, intrinsic motivation/task interest, perceived task competence, reward contingency conditions, sizes of reward and sex differences. These variables were investigated in a laboratory setting, with a view to isolating the best procedures for testing in field settings.

In chapter 2 of this thesis, the intrinsic-extrinsic dichotomy will be reviewed, along with Deci's cognitive evaluation theory, past studies with the issues of intrinsic motivation, competence and reward contingencies.

In chapter 3, the rationale for this study and the hypotheses to be tested are presented. A detailed account of the experimental design and procedure is presented in chapter 4. Chapter 5 presents the experimental results, which are discussed in a following chapter. A summary of the study constitutes the first section of the final chapter. Some of the implications and the limitations of the data presented in the preceding chapters are discussed and conclusions and implications for future research are drawn in the remaining sections of chapter 7.

Chapter 2
LITERATURE REVIEW

Over the years, psychologists have studied a number of concepts that have represented the essential energetic force which constitutes human motivation. The term of "motivation" was originally derived from the latin word *movere*, which means "to move". One motivational expert has discussed motivation in terms of intensity and direction, "It is generally acceptable that, in explaining goal-directed behaviour one must consider both what energizes the behaviour and what directs the behaviour toward the goal" (Lawler, 1973, p.3).

Recently, the concept of intrinsic motivation has attracted a considerable amount of research attention. One of the central reasons intrinsic motivation might be an important topic for research is the possible implication it has for employee work performance. It has been suggested that individuals who have high levels of intrinsic motivation, and thus value a work activity for its own sake, would be those individuals who perform their jobs effectively (Oldham, 1974). An intrinsically motivated individual feels a sense of competence and self-determination merely by engaging in and completing a work activity.

Several studies have demonstrated that certain extrinsic rewards decrease a person's intrinsic motivation. Money (Deci, 1972) decreases college students' intrinsic motivation for solving puzzles; prizes decreased elementary school children's enjoyment of competitive games (Kruglanski, Alon, & Lewis, 1972); money does not decrease intrinsic motivation if it is

paid noncontingently (Deci, 1972). Some investigators have observed decreases in intrinsic interest or motivation following administration of rewards that were contingent only upon engaging in activities (Calder & Staw, 1975). Recent research showed that pay had no effect upon intrinsic motivation, even though they recruited subjects with explicit promises of financial reward (Phillips and Lord, 1980).

Empirical results have been just as contradictory as the theoretical positions regarding the effects of reward contingencies on intrinsic motivation. This chapter makes no attempt to resolve such contradictory positions, but rather explicates the position of cognitive theorists (such as Deci et al., 1975), specifically as they relate to the current controversy on reward contingencies.

The review of literature is divided into three sections. In the first section, distinction of the intrinsic-extrinsic dichotomy is described. Cognitive evaluation theory proposed by Deci in relation to the contingent-noncontingent rewards controversy is discussed in the second section. Finally, a review is presented of available literature on reward contingency's effects on intrinsic motivation and competence. The implications of this study is also described at the end of this literature review.

DISTINCTION OF INTRINSIC-EXTRINSIC DICHOTOMY

The distinction between intrinsic and extrinsic motivation has been of long-standing interest within psychology. The roots of intrinsic-extrinsic motivation distinction can be traced back to the work of the earliest

cognitive theorists, Lewin (1938) and Tolman (1932). These two theorists in particular directed psychology away from an exclusively behaviourist orientation which assumed all motivation to be extrinsic. Throughout the 1940s and 1950s the intrinsic concept was developed and pursued by need theorists, who involved higher order needs such as self-esteem and self-actualization (Maslow, 1943) and the needs for autonomy (Angyal, 1941). The distinction between intrinsic and extrinsic motivation became popular when Herzberg (1959) introduced his distinction between motivator and hygiene factors. It was also emphasized in the voluminous research on exploration and curiosity that stresses the importance of intrinsically motivated vis-a-vis traditional drive states (Berlyne, 1960).

The intrinsic-extrinsic distinctions grew out of a need to explain behaviours not easily accounted for by exclusively extrinsic factors. Most approaches (e.g. behaviouristic and expectancy theories) to the study of task motivation have assumed that intrinsic and extrinsic motivation are independent states (Wimperis and Farr, 1979). However, cognitive evaluation theory (Deci et al., 1975) has argued that intrinsic and extrinsic motivational states are inversely related. Thus, intrinsic and extrinsic attributions cannot be made simultaneously. It had been assumed that intrinsic and extrinsic motivation were additive, that is, the addition of one to the other would increase total motivation. It was in this context that Deci conducted his research (Pinder, 1984).

Bem (1972) proposed that an individual's own behaviour is hypothesized to be understood by the individual in the context of salient environmental (extrinsic) and internal (intrinsic) cues. To the extent that

environmental cues are salient, unambiguous, and sufficient to account for one's action, these cues will be seen as causing the observed behaviour. In the absence of external cues, the causes of one's behaviour will be ascribed to internal processes. If a given situation presents the individual with both salient internal and external cues, then the behaviour of the individual may be over-justified in the sense that there are too many cues for the behaviour present (Lepper, Greene and Nisbett, 1973). In such a case, it is hypothesized that the individual's perceived locus of causality shifts away from oneself and toward the external reward.

A careful reading of literature regarding intrinsic versus extrinsic motivation shows considerable variance among authors in their definitions of these terms. For example, Saleh and Grygier (1969) define intrinsic factors as "those directly related to the actual performance of the job" and extrinsic factors as "those related to the environment in which the job is being performed" (p. 446). However, to Deci (1972), intrinsic rewards are those "mediated by the person himself", while extrinsic rewards are "externally mediated, mediated by someone other than the employee himself" (p. 218-219). The confused state of the literature led Dyer and Parker (1975) to hypothesize that the distinction between intrinsic and extrinsic is unclear and confusing to industrial and organizational psychologists. This conceptual ambiguity leads to difficulty in comparing empirical results from different studies and also in deciding whether the intrinsic-extrinsic distinction is really theoretically useful.

The intrinsic-extrinsic distinction has been employed in a variety of ways. In an attempt to categorize these usages, Broedling (1977) classified

them in two categories : as individual characteristics or fairly stable personality traits on which people differ, or as a fairly changeable psychological state. When used to characterize individual differences, the intrinsic-extrinsic distinction is most often used in organizational behaviour to describe a person's orientation toward one's work. When the intrinsic-extrinsic distinction is employed as a characteristic of individuals, it is similar to several other personality trait distinctions and is often used to describe them. One is Rotter's (1966) internal-external locus of control which refers to the extent to which a person perceives events as under one's control (internal) or as a result of forces beyond one's control (external). A similar distinction is deCharms' origin/pawn (1968), which describes the perception of controlling one's own behaviour versus having it controlled by outside agents. According to deCharms, *origins* are intrinsically motivated, while *pawns* are extrinsically motivated. A person is said to be intrinsically motivated whenever one experiences oneself as the locus of causality for one's behaviour (i.e. when the person sees oneself as origin). On the other hand, the person considers oneself extrinsically motivated when one perceives the locus of causality for one's behaviour as external (i.e. when the person perceives oneself as a pawn).

The commonality between the intrinsic-extrinsic distinction and the distinctions described by Broedling is that all are used to explain why some people in a given situation engage in certain classes of behaviours (loosely categorized as growth or self-actualization behaviours), more than do other people in the same situation. The other common line is that these

distinctions relate directly or indirectly to a person's feelings of control of both self and environment.

The intrinsic-extrinsic distinction also has been used to describe states of the individual, namely, a person's motivation or satisfaction at a given time, subject to change depending on circumstances. The major situational characteristics considered to be determining factors in employees' intrinsic-extrinsic states are : a) the type of rewards available,namely, whether extrinsic or intrinsic, b) job content, that is, how much of the job is intrinsically interesting, c) job autonomy - to the extent that employees do not perceive themselves controlling their own work, they will be in no position to receive intrinsic rewards and develop intrinsic satisfaction, d) leadership style - the extent to which supervisors employ participative practices allowing employees to exercise control over their work, e) reward contingencies - whether or not job outcomes are contingent upon performance and perceived as such (Broedling, 1977).

Deci's work draws heavily on deCharms (1968) and Bem (1972) and therefore can be considered to include both the effects of traits (origin/pawn) and situational characteristics.

With regard to Dyer and Parker's reports, Brief & Aldag (1977) offered distinctive definitions, in which the efforts of Koch (1956), deCharms (1968) and Deci (1975) are viewed collectively.

> Intrinsic work motivation is a cognitive state reflecting the extent to which the worker attributes the force of his or her task behaviours to outcomes derived from the task per se; that is, from outcomes which are not mediated by a source external to the task-person situation. Such

a state of motivation can be characterized as a self-fulfilling experience. (p. 497)

Extrinsic work motivation is a cognitive state reflecting the extent to which the worker attributes the force of his or her task behaviours to having and/or expecting to receive or experience some extrinsic outcome. Such a state of motivation can be characterized as regulated or instrumental experience. (p. 497)

Intrinsic outcomes relate to either the satisfaction or frustration of the higher level, or growth needs. Examples of intrinsic outcomes would include positive feelings of accomplishment or a sense of diminished self-esteem. Intrinsic outcomes depend, when they occur, immediately upon the performance of the acts that produce them. They are in a sense self-administered by the individual, rather than distributed by others. Extrinsic outcomes tend to relate more to gratification and frustration of the existence and relatedness needs. They include things such as pay and promotions. Moreover, they tend to be mediated by outsiders (Pinder, 1984).

Broedling (1977) proposed that the intrinsic/extrinsic distinction is basically useful and it is confusing to use it to describe both traits and states. However, the latter usage is more frequent.

COGNITIVE EVALUATION THEORY

Deci (1971) has developed a cognitive evaluation theory in an attempt to reconcile the contradictory evidence pertaining to the relationship between intrinsic and extrinsic motivation. His focus is on intrinsic

motivation and suggests that when a person engages in some activity for no apparent reward except the activity itself, one is paid to be intrinsically motivated to perform that activity. Deci (1972, 1975) tested the above assumption by manipulating reward structure and measuring intrinsic motivation for a given task as a result. Intrinsic motivation was measured in terms of the amount of time subjects dedicated to the task in a "free time" period. The results suggested that the addition of extrinsic rewards for an intrinsically motivating task will reduce intrinsic motivation.

It is becoming increasingly well documented that when people receive various extrinsic rewards for intrinsically motivated activity, their intrinsic motivation (Deci and Cascio, 1972), their interest in the activity (Calder and Staw, 1975) and their performance (Kruglanski, Freedman and Zeevi, 1971) will be adversely affected. Monetary rewards which are made contingent on performance and threats of punishment for poor performance decrease a person's intrinsic motivation for the activity. On the other hand, positive verbal reinforcements have been shown to increase intrinsic motivation for male subjects (Deci, Cascio and Krusell, 1973).

Deci's theory focuses on a person's cognitive evaluation of an activity and one's reasons for performing the activity. "...buying services could lead the subjects to a process of cognitive evaluation of the activity from one which is intrinsically motivated to one which is motivated by the anticipation of money" (Deci, 1972, p. 114). Deci et al. (1975) suggests that this is caused by a change in the person's locus of causality. When intrinsically motivated, the perceived locus of causality of a behaviour is internal; however, when people are rewarded they begin to perceive that the reward

is the cause of the activity, so the perceived locus of causality becomes external. This leaves them less intrinsically motivated since they are less likely to perform the activity in the absence of the extrinsic reward. This notion draws on self perception theory (Bem, 1972) which states that people examine their own behaviour, much as they do to the behaviour of other people and make attributions about their own motives for behaving as they do. His theory also suggests that distinctions should be made among different kinds of external rewards, since a person's evaluation of different rewards may be different. In turn this would lead to different effects on the person's intrinsic motivation.

The second process through which intrinsic motivation may be affected is based on the work of White (1959) and deCharms (1968), and comprises what Deci called a change in feelings of competence and self-determination. Rewards that convey to people that they are competent and self-determining increase their intrinsic motivation. Rewards that convey that they are not competent and self-determining decrease intrinsic motivation (Deci, 1976). Further, intrinsically motivated behaviours fall into two general classes. The first class is behaviour that people engage in to seek out optimally challenging situations. These challenges can be thought of as involving an incongruity or discrepancy, between a stimulus input and some standard of comparison. The second class is behaviour that aims to conquer the challenge or reduce the incongruity. In other words, people are involved in an ongoing process of seeking and conquering challenges.

Rewards offered for performing an intrinsically interesting activity can affect later interest in two ways. They can direct and control behaviour,

leading individuals to perceive their behaviour as caused by rewards. They can also provide performance feedback and lead to inferences about competence. When behaviour is perceived as extrinsically determined, subsequent intrinsic motivation is decreased. When perceptions of competence are developed, intrinsic motivation is enhanced (Deci et al., 1975; Lepper, 1981). These opposing effects on interest are considered independent and rewards for competence may initiate both processes simultaneously. Whichever feature (whether it is control or informational) is more salient should determine whether task interest will be undermined or enhanced (Ryan, Mims and Koestner, 1983).

The two central propositions of cognitive evaluation theory are that intinsically motivated behaviours occur whenever (a) people are allowed choices and perceive an internal locus of causality to their behaviour (evaluation of self-determination) and (b) they are supplied positive feedback that indicates an effective successful interaction with the environment, namely evaluation of competence (Reeve and Cole, 1987).

Deci and Ryan (1980) stated that there is a linear relation between perceived competence and interest. If the feedback indicates to the person that one is doing well at a task, one's feelings of competence are enhanced and one's intrinsic motivation for the task increased. But if the person perceives that one is doing poorly as a result of the feedback implied by the rewards or lack of rewards, one's feelings of competence will diminished as will one's intrinsic motivation and one will be less likely to engage in the task in the future, without some form of extrinsic incentive.

In their recent article, Deci and Ryan (1987) argued that the self-determination versus control distinction has often been wrongly equated with the intrinsic versus extrinsic distinction. Intrinsically motivated behaviour is by definition self-determined. It is done freely for the inherent satisfaction associated with certain activities while undertaking optimal challenges. Even though intrinsically motivated behaviour is the paradigmatic case of self-determination, it is not the only case of self-determined activity. Extrinsically motivated behaviour can also be self-determined. Extrinsic motivations on the other hand pertain to a wide variety of behaviours where the goals of action extend beyond those inherent in the activity itself, whether that goal be the avoidance of punishment or the pursuit of a valued outcome. Extrinsically motivated behaviour is not necessarily either self-determined or controlled. One could willingly and freely pursue some extrinsic end or one could be pressured toward a goal.

The competence and self determination formulation of intrinsic motivation clearly emphasizes the important role of cognitive factors in intrinsic motivation and clearly involves contingencies between behaviour and reward. One must be successful and effective in order to receive intrinsic reward.

PAST STUDIES ON REWARD CONTINGENCY CONTROVERSY

The experimental literature on intrinsic motivation includes a complicated set of studies on reward contingency. Various writers have used

different terminology and the results seem inconsistent and at times contradictory.

The issue of contingency first appeared in an article in which Deci (1971) compared the effects of contingent rewards, noncontingent rewards and no rewards. From the results of his experiment, Deci suggests that when money is used as an external reward for some activity, the subjects lose intrinsic motivation for the activity. On the other hand when verbal reinforcement and positive feedback are used as the external rewards, the subjects' intrinsic motivation seems to increase relative to the non-rewarded subjects'. Deci's explanation for this, is that it appears that money may act as a stimulus, which leads the subjects to a cognitive re-evaluation of the activity, from one which is intrinsically motivated to one which is motivated primarily by the expectation of financial rewards.

Deci (1972) also reported that contingent rewards decreased intrinsic motivation relative to noncontingent rewards and no rewards. Reward contingencies may differ in the performance feedback they convey. Rewards promised for participating in an activity (task-contingent) provide virtually no performance information. In contrast, rewards offered for attaining some level of achievement on a task (performance-contingent) can provide clear information about competence (Harackiewiecz and Manderlink, 1984).

Subsequently, several other investigators explored the contingency issue. Harackiewicz (1979) and Ryan et al. (1983) found that performance-contingent rewards reduced intrinsic motivation relative to controls receiving identical feedback. Even when rewards provided clear competence feedback, controlling factors may have outweighed informational ones in

affecting intrinsic interest. In contrast, three studies (Boggiano and Ruble, 1979; Karniol and Ross, 1977; Rosenfield, Folger and Adelman, 1980) found that performance-contingent rewards maintained interest relative to feedback controls. In these studies, the positive information counterbalanced the negative effects of the controlling contingency. It seems that performance-contingent reward will always have negative implications for interest, but they may be counteracted in some contexts by the information conveyed (Ryan et al., 1983).

Arnold (1976) concluded that previous research has tended to find general support for the hypotheses that the introduction of extrinsic rewards for the performance of an intrinsically motivating activity will result in a decrease in the level of intrinsic motivation. Arnold's results indicate that the hypothesis may not be valid when applied to situations in which individuals are clearly highly intrinsically motivated. High intrinsic motivation appears to be a sufficiently stable cognitive state so that the introduction of extrinsic rewards does not initiate a process of cognitive re-evaluation of the reason for or causes of one's behaviour. Even though informational feedback on task performance can have a potent effect upon perceived feelings of competence and hence intrinsic motivation, extrinsic rewards do not appear to influence feelings of competence.

Enzle and Ross (1978) found that subjects who received the task-contingent high reward rated the task as less interesting, while subjects who received the criterion-contingent (performance-contingent) high reward rated it as more interesting. Also, subjects expressed less interest in the task after receiving the high task-contingent reward than the low task-contingent

reward, but indicated greater interest after receiving the high criterion-contingent reward than the low criterion-contingent reward. Substantial support was obtained for Deci et al.'s (1975) cognitive evaluation theory.

Kiesler and Sakumura (1966) have reported results that are consistent with these. They found that if people stated opinions for which they received large payments ($5.00) for doing so, they were more susceptible to counterarguments than people who stated the opinions for small payments ($1.00). The cognitive interpretation of this according to Deci and Cascio (1972) is that the larger the payment, the more the subjects came to believe that they were performing for the payment, so the less strongly they held to their original attitudes because they no longer perceive of their attitudes as the reason for their behaviour.In the task-contingent conditions, where the control aspect of the reward was made salient, intrinsic interest in the task decreased as reward value increased.

Pinder (1976) reported that contingent payment was more detrimental to intrinsic motivation than noncontingent payment, supporting Deci's findings. On the other hand, Farr (1976) found no differences on intrinsic motivation between these two pay systems. He also found no effect of the pay manipulation in self-report measure of personal control. In this study, the average subject earned about $1.80. Subjects in the research of Deci could earn as much as $4.00. Reward magnitude could affect the saliency of the financial incentives. Ross (1975) found that increasing the saliency of rewards increased the detrimental effect of extrinsic rewards upon intrinsically motivated behaviours. Farr, Vance and McIntyre (1977) did not find a significant effect of reward magnitude on intrinsic motivation.

Hamner and Foster (1975) discovered that contingent payment increased intrinsic motivation for subjects working on dull tasks and did not interfere with intrinsic motivation for subjects working on interesting tasks. Fisher (1978) reported that even when rewards were seen as being quite controlling, they still did not affect intrinsic motivation in the simulated work setting. She also found that competence (self-rated performance) was significantly correlated with intrinsic motivation. But this effect applied only when performance was unconstrained by task difficulty, illustrating that performance must be viewed as being internally caused (i.e. resulting from competence) to have a substantial impact on intrinsic motivation.

Assigning subjects to one of three conditions (no pay, fixed pay and pay contingent on performance), Arnold (1985) demonstrated a lack of significant differences between the conditions. The results did not support the hypothesis that extrinsic rewards undermine intrinsic interests, but showed a significant positive relation between performance and perceived competence, indicating that subjects who perceived themselves as relatively competent on the task tended to return for additional sessions. A negative relation between performance and external attribution, indicated that poor performers tended to attribute their lack of success to factors outside themselves.

Kruglanski et al. (1975) discovered that the inhibitory effect occurred when monetary rewards were added to a task in which money was not inherent in its content, while an enhancement of intrinsic interest was obtained when monetary rewards were added to a task in which money was considered to be part of its content. These data were used to support a

"content-consequence" theory in which money can act either to enhance or inhibit task attitudes depending upon whether it is inherent in the activities of the task itself. In their study, Staw, Calder, Hess, and Sandelands (1980) confirmed that the payment of a monetary reward for performing an interesting task decreased overall task satisfaction only if there was a norm for no payment. When there was a norm for payment, task satisfaction was not inhibited by the reward.

Harackiewicz, Sansone and Manderlink (1984) identified three components of performance-contingent reward structures: namely, an evaluative contingency established before playing, performance feedback and the receipt of a reward (as the cue value). They found that evaluation reduced intrinsic motivation, compared with controls, whereas reward enhanced intrinsic motivation relative to evaluation. They also found that unexpected performance-contingent rewards enhanced interest, compared with expected rewards. These results suggest that the three reward properties have separate effects on intrinsic motivation. Anticipation of evaluation is responsible for negative reward effects, whereas competence feedback and cue value have independent positive effects.

To examine whether competence information is the feedback feature that affects intrinsic motivation and whether perceived competence is the process responsible, Sansone (1986) conducted two studies comparing competence feedback (normative standards provided) with meaningful task feedback (problem solution provided). Results demonstrated that enjoyment of a task can be enhanced by both normatively based competence feedback and task feedback. At least two processes appear to be responsible for these

effects, namely, perceived competence and personal valuation (personal importance of doing well). The relation between these processes and interest depends on the larger context in which the activity is performed. Feelings of competence appear to be particularly important or enhance intrinsic motivation only if attaining competence is perceived as a primary goal of participation.

More latterly, Scott, Farh and Podsakoff (1988) were led by their research results to the conclusion that there was little reason to believe that the design and implementation of effective extrinsic reinforcement contingencies will destroy one's pride in one's work, the intrinsic worth or meaningfulness of the job, or one's "intrinsic motivation" to perform it.

Ryan, et al. (1983) recognized the problem with various definitions of reward contingency. Different researchers have used different terms to mean the same thing and the same terms to mean different things. Ryan at al. attempted to employ a consistent set of definition to account for the discrepant findings reported in the literature. They defined a task-noncontingent reward as an expected reward given solely for task participation. Allocation of a task-contingent reward is based on task completion, while a performance-contingent reward is given if the participant reaches a predetermined criterion of task mastery. In examining these different types of rewards, Ryan et al. reported that performance-contingent rewards that contain information on competence enhance intrinsic motivation relative to task-contingent rewards, and decrease intrinsic motivation when administered controllingly. In either case performance-contingent rewards like all other rewards, tend to lower

intrinsic motivation relative to no rewards if there is identical feedback within the same interpersonal context.

Using these definitions of reward contingencies, Bordieri (1988) conducted a study in which an observer simulation and a within subject variable (i.e. size of reward) were used to examine the effects of reward contingency and performance feedback on intrinsic motivation. Subjects assessed the intrinsic motivation and task competence of two actors who performed a task for monetary rewards. The results demonstrated that when actors received rewards based on the quality of their task performance, subjects attributed greater intrinsic motivation to the actor earning $4 than the one earning $1. Similarly, the subjects estimated that the self-perceptions of task competence for the performance-contingent-rewarded actors increased as a function of reward size and covaried positively with intrinsic motivation. In contrast, a reverse incentive effect for perceived intrinsic motivation was reported for actors who received task-noncontingent rewards or task-contingent rewards allocated upon quantitative aspects of performance. In both these reward conditions, perceived competence on a task was not related to the measure of the enjoyment of the task, suggesting that the control function of the reward was salient for estimating intrinsic motivation of these actors.

In the present study, I examined the effects of reward contingency and magnitude of reward on perceived competence and intrinsic motivation. There were three kinds of reward contingencies involved, namely, task-noncontingent, task-contingent and performance-contingent rewards. And there were two sizes of rewards, $5.00 and $1.70 for task non-contingent and

performance contingent reward conditions, and 8 cents per problem solved for task contingent condition. Feedback manipulations were given through instructions. The relationship between perceived competence and intrinsic motivation were demonstrated with regard to contradictory results of the past studies.

Deci and Ryan (1980) argue that competence information may have different meanings for males and females, reflecting socialization differences. Men may view a mechanical task such as performing mathematical computations relatively simple, while females initially may view the task as complex or difficult. Thus what may appear to be the same task for male and female participants may be objectively two different tasks, at least until males and females become equally familiar with the task (Huber and Podsakoff, 1985). With these in mind, I involved gender differences in my study.

The findings of this study can further extend the knowledge in this area of research, demonstrating the controversial issue of reward contingencies' effects on intrinsic motivation and perceived competence, which leads to a knowledge of the effectiveness of administering a reward.

Chapter 3

RATIONALE OF THE STUDY & HYPOTHESES

This study aimed to follow the trend of recent research as described in the literature review, with the principal purpose of examining possible interactive and main effects of the allocation of reward (task-noncontingent reward/task-contingent reward /performance-contingent reward) and the magnitude of reward ($5.00/$1.70) upon intrinsic motivation/task interest and perceived competence.

The idea for this study originated in the study by Bordieri (1988), who demonstrated that perceived intrinsic motivation and perceived competence of actors varied as a function of the interaction between the criteria for allocation and the magnitude of reward. As Bem (1972) suggests that actors and observers use identical self-perception processes in making attributions for behaviour, this study investigated Bordieri's findings from the actors' self reports of their intrinsic motivation/task interest and perceived task competence.

The specific hypotheses examined were :

1. There will be significant main effects on perceived intrinsic motivation as a function of the interaction between the criteria for allocation and magnitude of reward.
2. There will be significant main effects on perceived competence as a function of the interaction between the criteria for allocation and magnitude of reward.

3. There will be a significant relationship between the subjects' intrinsic motivation and perceived competence in the performance-contingent reward condition.

4. There will be no significant relationship between the subjects' intrinsic motivation and perceived competence in the task-noncontingent reward condition.

5. There will be no significant relationship between the subjects' intrinsic motivation and perceived competence in the task-contingent reward condition.

Sex differences were also examined, to see if there were any differences that can be accounted for in terms of the socialization of males versus females in society. As Deci, Cascio and Krusell (1973) pointed out, the role "traditionally" ascribed to women is a more dependent one. They are encouraged to be more sensitive to other people. Females evaluate feedback in a way that is different from the way males evaluate it. It should be noted that no specific hypotheses concerning sex differences were made in this study.

Chapter 4

RESEARCH METHODOLOGY

OVERVIEW

This study involved a 3 x 2 x 2 factorial design (task-noncontingent reward/task-contingent reward/performance-contingent reward by two magnitudes of reward by sex differences). Subjects were randomly assigned to one of the six experimental conditions. Each subject's task involved the Mechanical Reasoning Test from the Differential Aptitude Test battery given under one of the six monetary reward conditions. Upon completion of the task, the subject was given the reward and then completed two scales assessing one's perceived competence and intrinsic motivation/task interest, and also completed a behavioural measure.

SUBJECTS

The sampling involved a stratified random sampling, of students from stage 2 psychology laboratory classes. The students participated in the study on a purely voluntary basis. A one page form was prepared in order for the students willing to participate to write down their time of availability. This form was given to the participants after the researcher described the nature of the study and stated that the participants would be contacted by telephone in the near future for their schedule.

66 subjects (23 males, 43 females) out of 78 students who agreed to participate were obtained. They were aged between19 to 23 years. The total

number of subjects was 25% of the students attending stage 2 laboratory classes. Gender was approximately evenly distributed across conditions.

The subjects were contacted by telephone a day before the experiment to inform them of their time schedule and the room where the experiment would be held.

MATERIALS

A. Mechanical Reasoning Test

The Mechanical Reasoning Test is part of the Differential Aptitude Test battery revised in 1974 by George K. Bennett. It comprises of 68 items. Each item consists of a pictorially presented mechanical situation together with a simply worded question. Care was taken to present items in terms of simple, frequently encountered mechanisms that do not resemble textbook illustrations or require special knowledge (Bennet, Seashore and Wesman, 1974).

The ability measured by the Mechanical Reasoning test may be regarded as one aspect of intelligence broadly defined. It is said to measure a person's understanding of the relationship between physical and mechanical forces in everyday life. This test was utilized as a task in the study to parallel the study done by Bordieri (1988).

B. The Scales

To measure intrinsic motivation/task interest or attractiveness subjects were asked to respond to a series of semantic differential scales set against

the concept "My Task" (Scott & Rowland, 1970). The scales used in this study were the bipolar scales utilized by Fikree (1984). Fifteen scales were involved reflecting the individual's perception of the complexity, novelty and variation intrinsic to the task as well as reflecting individual's affective reaction to the task. To investigate task interest, the positions for each scale on the semantic differential scale of "My Task" were assigned a number from 1 through 7, with 1 assigned to the left hand side of the scale, indicating the most preferred condition. Each subject's ratings on each bipolar scale in the six experimental conditions were summed to produce a measure of intrinsic motivation/task interest.

To measure perceived competence, subjects were asked to respond to a series of semantic differential scales taken from the bipolar scales that have been set against the concept "My Supervisor" (Scott & Rowland, 1970). Only scales that reflect personal competence and relevant to self-perception were used. There were ten scales involved, and each subjects' measure of perceived competence comprised the sum of his/her ratings.

C. Behavioural Measure

A behavioural measure of intrinsic motivation was also used. After subjects had completed the scales, they were asked to volunteer for an additional nonrewarded session. Subjects were told that they would perform the same task in the additional session. The number of subjects in each experimental condition volunteering for the extra session was used as an index of intrinsic motivation. This kind of behavioural measure has been used by several researchers, e.g. Wimperis & Farr (1979).

PROCEDURE

Subjects were tested individually by the experimenter. They were briefly informed of the nature of the study, similar to what was told to potential volunteers. Testing lasted for 10 or 30 minutes according to the condition in which the subject had been randomly assigned.

a. In Condition One (Task-noncontingent reward/$5.00), the subject was asked to complete as many items of the Mechanical Reasoning Test as he/she could during a given period of time, which was 30 minutes. He/she was told that there would be a reward of $5.00 for participation. After 30 minutes the subject was asked to stop, was given the monetary reward, and was then asked to complete the scales and the behavioural measure.

b. In Condition Two (Task-noncontingent reward/$1.70), the subject was asked to complete as many items as he/she could in a period of 10 minutes. He/she was told about the reward involved, namely $1.70. After 10 minutes the subject was asked to stop, was given the monetary reward and was asked to complete the scales and behavioural measure.

c. In Condition Three (Task-contingent reward/8 cents per problem), the subject was asked to complete as many items as he/she could in a period of 30 minutes. He/she was told that there would be a monetary reward involved,of 8 cents for every item he/she solved correctly. After 30 minutes the subject was asked to stop, the answer sheet was checked and the subject was given the reward according to his/her correct answers. He/she was then asked to complete the scales and the behavioural measure.

d. In Condition Four (Task-contingent reward/8 cents per problem), the subject was asked to complete as many items as he/she could in a period of 10 minutes. He/she was told about the monetary reward of 8 cents for every item that he/she solved correctly. After 10 minutes the answer sheet was checked and the subject was given the reward according to his/her correct answers. He/she was also asked to complete the scales and behavioural measure.

e. In Condition Five (Performance-contingent reward/$5.00), each subject was asked to complete as many items as he/she could in a period of 30 minutes. The subject was told about the monetary reward, of either $5.00 or $1.70, depending on how well he/she performed compared to other participants. At the end of the given period, the subject was asked to stop, the answer sheet was checked and the subject was told that he/she had performed above average, therefore he/she was given $5.00. The scales and behavioural measure were asked to be completed before he/she left the room.

e. In Condition Six (Performance-contingent reward/$1.70), the subject was asked to complete as many items as he/she could in a period of 10 minutes. He/she was told about the reward to be given depending on how well he/she performed compared to the other participants. After 10 minutes the subject was asked to stop, the answer sheet was checked and the subject was told that he/she had performed below the average of the other participants, and was therefore given only $1.70. The subject then completed the scales and behavioural measure.

THE PRETEST

Three weeks before the actual study a pretest was organised with subjects known to the experimenter. The major purpose was to evaluate the level of interest or attractiveness of the task as perceived by the subjects. A second purpose was to check the reliability of the scales to be used in the actual experiment. Only six subjects participated, one in each condition.

Table 1. Means and Standard Deviations For Task Interest Ratings of Pretest Subjects on the Semantic Differential Scale My Task.

Scales	M	SD
Good - Bad	2.833	.983
Interesting - Boring	3.333	1.033
Complex - Simple	2.833	1.169
Pleasant - Unpleasant	3.167	1.169
Difficult - Easy	3.333	.516
Structured - Unstructured	2.833	.408
Attractive - Repulsive	3.667	.816
Explicit - Vague	2.333	.816
Clear - Hazy	2.500	.837
Meaningful - Meaningless	3.833	.753
Varied - Routine	4.167	.753
Tangible - Intangible	3.167	.753
Positive - Negative	3.500	.837
Broad - Narrow	4.333	.516
Exciting - Dull	3.500	.837

Note: Directions of polarity 1 - 7, with 1 indicating high interest

Table 1 shows that nearly all of the means fell on the left hand side of the scale, indicating the pre-test group perceived the task to be interesting. A

reliability check showed this scale to have a reliability of .71 (Cronbach's alpha).

Table 2. Means and Standard Deviations for Perceived Task Competence of Pretest Subjects

Scales	M	SD
Strong - Weak	3.833	1.329
Positive - Negative	3.167	.983
Effective - Ineffective	3.167	1.329
Organized - Unorganized	2.833	1.169
Decisive - Indecisive	3.600	.894
Fast - Slow	3.833	1.722
Successful - Unsuccessful	3.167	1.329
Certain - Uncertain	3.000	.894
Skillful - Bungling	3.333	1.211
Careful - Careless	3.667	1.366

Note : Direction of polarity 1 - 7, with 1 indicating high perceived competence

Table 2 shows that most of the means fell on the left hand side of the scale, indicating that the pretest group perceived themselves to be competent at the task. Cronbach's alpha was computed and showed a reliability of .87.

STATISTICAL ANALYSES

A 3 x 2 x 2 analysis of variance was conducted for intrinsic motivation/task interest and perceived task competence.

Means and standard deviations were calculated for each of the scales of the two dependent measures and reliability tests were performed for the scales.

Pearson correlations were performed on the two dependent measures, for each experimental condition.

A chi-square test was conducted for the behavioural measure.

Chapter 5

RESULTS

REWARD CONTINGENCIES X SIZES OF REWARD X SEX DIFFERENCES

The analysis of variance on intrinsic motivation/task interest (i.e., summed ratings) revealed a significant interaction ($F(2,60)=4.725$, $p<.05$, refer appendix G) between the criteria for allocation of reward (task-noncontingent reward/task-contingent reward/performance contingent reward) and the magnitude of reward ($5.00/$1.70, see table 3).

Means and standard deviations (table 4) indicate that monetary reward decreased self-reports on intrinsic motivation/task interest for subjects in the performance-contingent reward condition ($1.70/below average). Significant differences ($p < .05$) were found between task-noncontingent reward/$5.00, task-contingent reward/8 cents per problem (30 minutes), task-contingent reward (10 minutes), performance-contingent reward/$5.00 (above average) and performance-contingent reward/$1.70 (below average).

Sex differences in intrinsic motivation/task interest within the six experimental conditions were not significant, therefore the interactive effects of criteria of allocation and magnitude of reward on intrinsic motivation were similar for male and female subjects. However, the differences were significant ($p<.05$) between the four experimental conditions, with male subjects in the performance-contingent reward condition ($1.70/below average) were less intrinsically motivated than female subjects in the task-noncontingent reward ($1.70), task-contingent

Table 3. **Means and Standard Deviations (In Brackets) For Summed Ratings on Intrinsic Motivation/Task Interest**

	Task-noncontingent reward				Task-contingent reward				Performance-contingent reward			
	\$5.00 30 minutes		\$1.70 10 minutes		8 cents/problem 30 min		10 min		\$5.00 30 minutes		\$1.70 10 minutes	
Dependent Variable	Male n=4	Female n=7	Male n=4	Female n=7	Male n=3	Female n=8	Male n=4	Female n=7	Male n=4	Female n=7	Male n=4	Female n=7
Intrinsic Motivation/Task Interest	3.350 (.695)	3.047 (.437)	3.233 (.234)	3.514 (.390)	3.044 (.668)	3.341 (.837)	2.900 (.394)	2.828 (.465)	2.933 (.566)	3.047 (.522)	4.000 (1.240)	3.666 (.973)

Note : Direction of polarity 1 - 7, with 1 indicating high interest

Table 4. **Means and Standard Deviations (In Brackets) For Task Interest Ratings On The Semantic Differential Scale My Task**

	Task-noncontingent reward				Task-contingent reward				Performance-contingent reward			
	$5.00 30 minutes		$1.70 10 minutes		8 cents/problem 30 min		10 min		$5.00 30 minutes		$1.70 10 minutes	
SCALES	Male n=4	Female n=7	Male n=4	Female n=7	Male n=3	Female n=8	Male n=4	Female n=7	Male n=4	Female n=7	Male n=4	Female n=7
Good - Bad	3.500 (1.291)	2.714 (1.496)	2.000 (0.000)	3.143 (1.069	2.000 (0.000)	3.000 (1.069)	2.500 (.577)	1.857 (.378)	2.500 (1.000)	3.000 (.816)	3.500 (1.000)	3.429 (.787)
Interesting-Boring	2.000 (.816)	2.000 (.577)	2.500 (.577)	2.714 (1.254)	2.000 (0.000)	3.000 (1.512)	2.250 (.500)	2.143 (.690)	2.250 (1.258)	2.571 (1.272)	4.000 (1.414)	3.571 (1.512)
Complex-Simple	3.250 (2.217)	2.714 (1.254)	4.000 (1.414)	4.143 (2.116)	4.000 (1.000)	4.125 (1.885)	4.000 (1.414)	3.429 (1.272)	3.500 (1.732)	2.857 (.900)	4.250 (1.500)	3.143 (1.574)
Pleasant-Unpleasant	3.250 (0.500)	2.857 (1.215)	3.000 (.816)	3.571 (1.718)	2.333 (.577)	3.125 (.991)	2.750 (.957)	2.857 (1.215)	2.500 (1.000)	3.000 (1.000)	3.500 (1.732)	4.000 (1.291)
Difficult-Easy	3.143 (1.464)	3.750 (1.708)	4.500 (1.000)	4.286 (1.976)	4.667 (1.528)	4.000 (1.690)	3.750 (1.708)	4.143 (1.464)	4.500 (1.915)	3.571 (.976)	3.750 (2.217)	2.857 (1.069)
Structured-Unstructured	2.286 (.951)	2.250 (1.258)	2.250 (1.258)	3.000 (1.633)	2.667 (1.528)	2.250 (1.282)	2.000 (.816)	2.143 (1.574)	3.000 (0.000)	2.429 (.535)	3.750 (.957)	3.143 (1.345)
Attractive-Repulsive	3.250 (1.500)	3.000 (2.160)	3.000 (.816)	3.714 (.756)	2.667 (1.155)	3.500 (1.309)	3.000 (.816)	3.143 (1.069)	3.250 (.957)	3.286 (.951)	4.500 (1.291)	3.857 (1.069)
Explicit-Vague	3.000 (.816)	2.143 (.900)	2.250 (1.258)	2.286 (.488)	3.000 (1.000)	2.250 (1.035)	1.750 (.500)	2.143 (1.574)	2.000 (.816)	2.143 (1.069)	3.250 (1.258)	2.714 (1.380)
Clear-Hazy	3.000 (1.414)	2.143 (.690)	2.000 (1.414)	2.143 (.378)	2.333 (1.155)	2.125 (.835)	2.500 (1.732)	1.714 (.951)	1.750 (.500)	2.000 (.577)	3.750 (1.500)	2.571 (1.134)
Meaningful-Meaningless	3.250 (1.893)	3.429 (.976)	3.750 (.957)	4.143 (1.345)	3.000 (1.732)	3.125 (1.246)	3.000 (0.000)	2.857 (1.069)	2.750 (.957)	3.571 (.535)	4.500 (1.732)	4.857 (.900)
Varied-Routine	4.500 (1.732)	4.429 (1.397)	4.750 (1.258)	4.286 (1.604)	4.000 (1.732)	5.125 (1.246)	5.000 (.816)	4.000 (1.291)	3.750 (1.500)	4.286 (1.380)	5.000 (1.826)	5.286 (1.380)
Tangible-Intangible	4.250 (1.258)	2.714 (1.113)	3.750 (.957)	3.143 (.900)	2.667 (.577)	3.125 (1.126)	2.750 (.957)	2.286 (1.380)	1.250 (.500)	2.857 (.690)	3.750 (.957)	3.143 (1.069)
Positive-Negative	3.250 (.957)	3.286 (.756)	2.750 (.957)	3.000 (1.000)	2.333 (.1.528)	3.250 (.886)	2.500 (.577)	2.143 (1.069)	3.000 (1.155)	3.143 (.900)	3.500 (1.000)	3.857 (1.069
Broad-Narrow	4.250 (1.708)	4.571 (1.512)	4.250 (1.500)	4.714 (.488)	5.000 (1.000)	4.750 (1.035)	4.500 (1.000)	4.000 (1.000)	4.250 (1.258)	4.714 (.488)	5.500 (1.291)	4.714 (.756)
Exciting-Dull	3.500 (1.732)	3.714 (1.799)	3.750 (.500)	4.429 (.787)	3.000 (0.000)	3.875 (1.727)	3.000 (.816)	3.571 (.787)	3.750 (.500)	3.429 (1.397)	4.500 (2.082)	4.429 (1.902)

Note : Direction of polarity 1 - 7, with 1 indicating high interest

reward (10 minutes), and performance-contingent reward conditions ($5.00/above average).

Allocation of reward, magnitude of reward and the interaction between the two were all significant for perceived task competence (i.e., summed ratings) ($F(2, 60)=6.169$; $F(1, 60)=15.833$; $F(2,60)=18.602$, $p<.01$, refer appendix G, see table 5). There were significant differences ($p<.01$ and $p<.05$) between task-noncontingent reward ($5.00 & $1.70), task-contingent reward (8 cents per problem /30 minutes & 10 minutes), performance-contingent reward ($5.00/above average) and performance-contingent reward ($1.70/below average). These results indicate that performance-contingent reward involving informing subjects that their performance was below average decreased perceived task competence.

Sex differences in perceived task competence between the six experimental conditions were also significant ($F(1,53)=10.522$, $p<.01$, refer to appendix G). Means and standard deviations (table 6) showed that monetary reward had an effect on male and female subjects' perceived task competence. However, no significant differences were found within the experimental conditions. Significant differences ($p<.01$ and $p<.05$) were demonstrated between male subjects' perceived competence in task-noncontingent reward condition ($5.00 & $1.70) and female subjects' in performance-contingent reward condition ($1.70/below average), between male subjects' perceived competence in the task-contingent reward condition (8 cents per problem/30 minutes) and female subjects' in the task-noncontingent reward condition ($5.00 & $1.70), performance-contingent reward condition (below average), between male subjects' perceived

Table 5. **Means and Standard Deviations (In Brackets) For Summed Ratings on Perceived Competence**

	Task-noncontingent reward				Task-contingent reward				Performance-contingent reward			
	$5.00 30 minutes		$1.70 10 minutes		8 cents/problem 30 min		10 min		$5.00 30 minutes		$1.70 10 minutes	
Dependent Variable	Male n=4	Female n=7	Male n=4	Female n=7	Male n=3	Female n=8	Male n=4	Female n=7	Male n=4	Female n=7	Male n=4	Female n=7
Perceived Task Competence	2.550 (.507)	3.414 (.884)	2.625 (.472)	3.429 (.955)	2.333 (.153)	3.300 (.859)	2.750 (.493)	2.943 (.640)	2.300 (.469)	2.643 (.898)	4.525 (1.209)	5.257 (.408)

Note : Direction of polarity 1 - 7, with 1 indicating high perceived competence

Table 6. **Means and Standard Deviations (In Brackets) For Competence Ratings On The Semantic Differential Scale Perceived Task Competence**

	Task-noncontingent reward				Task-contingent reward				Performance-contingent reward			
	$5.00 30 minutes		$1.70 10 minutes		8 cents/problem 30 min		10 min		$5.00 30 minutes		$1.70 10 minutes	
SCALES	Male n=4	Female n=7	Male n=4	Female n=7	Male n=3	Female n=8	Male n=4	Female n=7	Male n=4	Female n=7	Male n=4	Female n=7
Strong-Weak	2.500	3.714	2.250	3.286	2.333	3.125	2.750	3.143	2.250	3.000	5.000	4.857
	(.577)	(.756)	(.500)	(1.113)	(.577)	(.991)	(.957)	(1.069)	(.500)	(1.915)	(1.414)	(.690)
Positive-Negative	2.250	3.286	2.500	3.143	2.333	3.250	2.750	2.429	2.714	1.750	4.250	4.714
	(.957)	(.756)	(1.000)	(1.345)	(.577)	(1.165)	(500)	(.787)	(1.113)	(.500)	(.957)	(1.113)
Effective-Ineffective	2.250	3.286	2.500	3.429	2.000	3.500	2.000	2.571	2.714	2.000	4.500	5.000
	(.500)	(1.113)	(.577)	(1.272)	(0.000)	(1.195)	(0.000)	(.535)	(1.113)	(.816)	(2.082)	(1.155)
Organized-Unorganized	2.000	3.429	2.500	3.286	2.333	3.250	2.000	2.714	2.143	2.750	4.250	5.857
	(.816)	(.976)	(1.000)	(.951)	(.577)	(1.389)	(0.000)	(.756)	(.900)	(.500)	(1.708)	(.900)
Decisive-Indecisive	2.750	2.571	2.500	3.429	2.000	3.000	3.000	3.571	2.714	2.250	3.750	5.000
	(.500)	(.976)	(.577)	(1.134)	(0.000)	(1.069)	(.816)	(1.618)	(1.254)	(.957)	(.957)	(1.000)
Fast-Slow	3.500	3.429	4.250	4.286	2.667	3.625	3.500	4.143	3.143	2.500	4.750	5.000
	(.577)	(1.397)	(.957)	(.756)	(1.528)	(1.506)	(1.732)	(1.069)	(1.215)	(1.291)	(1.500)	(1.291)
Successful-Unsuccessful	2.000	3.714	2.750	3.429	2.000	3.250	2.750	2.857	2.250	2.571	4.500	5.857
	(.816)	(1.113)	(.957)	(.976)	(0.000)	(1.282)	(.500)	(.690)	(.500)	(.976)	(.690)	(1.000)
Certain-Uncertain	2.500	4.000	2.250	3.571	2.000	3.375	3.250	3.143	2.250	3.000	4.000	5.429
	(.577)	(1.155)	(.500)	(1.718)	(0.000)	(1.061)	(1.258)	(1.069)	(.500)	(1.155)	(1.414)	(.787)
Skillful-Bungling	3.250	3.571	2.750	3.571	2.333	3.875	2.750	3.143	2.857	2.500	4.750	6.000
	(.500)	(.787)	(.500)	(1.134)	(.577)	(.835)	(.500)	(.690)	(1.069)	(.577)	(1.258)	(.816)
Careful-Careless	2.500	3.143	2.000	2.857	3.333	2.750	2.750	2.286	2.500	2.571	5.500	4.714
	(1.915)	(1.464)	(0.000)	(.690)	(1.528)	(1.035)	(.957)	(.488)	(.577)	(.976)	(2.380)	(1.113)

Note : Direction of polarity 1 - 7, with 1 indicating high perceived competence

competence in the task-contingent reward condition (8 cents per problem/10 minutes) and female subjects' in the performance-contingent reward condition (below average), between female subjects' perceived competence in the task-contingent reward condition (10 minutes/30 minutes) and male subjects' in the performance-contingent reward condition (below average), between female subjects' perceived competence in the task-noncontingent reward condition ($5.00) and male subjects' in the performance contingent reward condition (below average). Most of the sex differences in self reports of perceived task competence were between the five experimental conditions and condition six (performance-contingent reward/$1.70, below average).

CORRELATIONS OF TASK INTEREST AND PERCEIVED COMPETENCE

Table 7 presents Pearson's correlation of task attractiveness/intrinsic motivation and perceived task competence for the six experimental conditions. Results indicate no significant correlations between the two independent variables.

Table 7. **Correlations of Intrinsic Motivation /Task Interest and Perceived Task Competence**

Task Interest		Task-noncontingent Reward		Task-Contingent Reward		Performance-contingent Reward	
Perceived Competence		Size 1	Size 2	Size 1	Size 2	Size 1	Size 2
Task-noncont. Reward	Size 1	.09					
	Size 2		.28				
Task-cont. Reward	Size 1			.20			
	Size 2				.27		
Perf.-cont. Reward	Size 1					.47	
	Size 2						.41

RELIABILITY OF THE SCALES

Coefficient alpha (Cronbach, 1951) estimates of reliability were computed for the semantic differential scale My Task and Perceived Task Competence. They were both quite reliable with coefficient alpha values of .85 and .95.

BEHAVIOURAL MEASURE

A Chi-square test on the behavioural measure showed significant differences ($p < .05$) between the subjects who agreed to volunteer for unrewarded sessions and who did not agree. However, there were no

differences in the performance contingent reward/$1.70 (below average) condition regarding volunteer rates for the extra nonrewarded sessions.

Table 8. **Number of subjects volunteering to return to the nonrewarded session**

Pay Condition	Yes	No	Total
Task-noncontingent Reward			
Size 1	7	4	11
Size 2	9	2	11
Task-Contingent Reward			
Size 1	10	1	11
Size 2	10	1	11
Performance-Contingent Reward			
Size 1	11	0	11
Size 2	6	5	11
Total	53	13	66

Chi-square(5, N = 66) = 11.594, $p<.05$

Chapter 6
DISCUSSION

Two manipulations of intrinsic motivation and perceived competence were used in this study : reward contingency and size of reward which were stressed on the instructions provided to the subjects. Both are perceived by the subjects and impacted upon their attitude toward the task and their competence.

Significant interactions were found between the two manipulations. Although most of the subjects in this study considered the task to be interesting, there were differences reported between them. Subjects who were given rewards on the basis of their participation (whether the reward was $5.00 or $1.70) were found to be more intrinsically motivated than subjects given $1.70 because they performed below average. This result supports Deci et al. (1975) who maintained that non-contingent rewards do not produce an inhibitory effect on intrinsic motivation because they are less likely to be perceived as a control mechanism. Significant differences were also demonstrated between subjects who were given the reward on the basis of the problem solved (in a period of 30 minutes) and subjects who were given $1.70 (below average), with decreased intrinsic motivation in the latter condition. The possible explanation for this was that the subjects in the latter condition perceived the feedback through administration of reward ($1.70) as informational (subjects' lack of mastery), leading to saliency of their incompetence and thus diminishing their intrinsic motivation/task interest. This was more powerful than the controlling aspect in the task-contingent reward condition (30 minutes). These results provided support

for hypothesis 1, Deci et al.'s (1975) cognitive evaluation theory and Bordieri's (1988) results, from which this study originated.

Sex differences within each experimental conditions were not significant. Female subjects seemed to have a similar interest in the task to male subjects. This may have been due to its mechanical nature, assumed to be more complex for females than males (Huber and Podsakoff, 1985). Female subjects might have found the task to be challenging and therefore interesting.

Unlike its effects on intrinsic motivation/task interest, pay manipulations were significant on perceived task competence (refer to appendix G), thereby supporting hypothesis two. Significant differences were demonstrated between the five experimental conditions, and the condition where subjects were informed that their performance was below average ($1.70). This feedback decreased the subjects' perceived task competence, while subjects on the other conditions perceived themselves to be competent at the task. Sex differences were found to be significant but the differences within the six experimental conditions were not significant. In table 4, it can be observed that most of the male subjects were competent relative to the female subjects. This supported the notion that men appear to feel both more personally involved and more competent than women (Harackiewicz, 1979), especially with a task assumed to be more complex for males than females. Surprisingly, female subjects perceived themselves to be more competent, when they were given the reward according to the problem they solved, and when given $5.00 reward because of their participation, than male subjects who were given $1.70 because they

performed below average. These may have been due to the fact that male subjects' lack of mastery leads to a perceived lack of competence, irrelevant to the nature of the task. As Harter (1981) suggests, males may be particularly responsive in ego-involvement situations that promote the use of internal criteria in the evaluation of competence.

In all of the reward conditions, there were no significant relationships between intrinsic motivation/task interest and perceived competence. However, all of the correlations were positive (refer to table 5). In task-noncontingent and task-contingent reward condition, perceived competence on the task was not related to the measure of task interest, suggesting that control function of the reward was salient for estimating intrinsic motivation on task-contingent reward condition, while no effect on task-noncontingent reward condition. This result supports hypotheses 4 and 5, as well as Deci (1975) and Bordieri's (1988) prediction. Highest correlations were observed in the performance-contingent reward condition with results of r=.47 ($5/above average) and r=.41 ($1.70/below average). However, the results did not support hypothesis 3, therefore contradicting Deci's prediction of a linear relation between perceived competence and intrinsic motivation/task interest. A possible explanation for this contradictory result was that the subjects might have perceived the reward as ambiguous (controlling and informational). If so, perceived competence was then neither clearly relevant nor irrelevant to intrinsic motivation/task interest, indicated by the lack of a significant relation between perceived competence and task interest in that condition.

In summary, this study provided partial support for Deci and Bordieri's predictions. Several plausible explanations are available for the contradictory results. Firstly, the subjects in Deci's studies participated as part of the course requirements on psychology introductory classes. In the present study the subjects participated on a purely voluntary basis. Although they were informed that the study looked at the effects of several type of reward contingencies on one facet of motivation, the amount of monetary reward was not mentioned. Since the subjects were stage 2 psychology students, most of them participated to help the researcher as well as to gain experience in how research is conducted. It may be that subjects who participated in this study were more clearly intrinsically motivated. Therefore the introduction of extrinsic rewards did not have a significant effect upon the relationship between intrinsic motivation/task interest and perceived task competence. In comparison with Bordieri's study, the present study utilized actors instead of observers, and adopted a between rather than within subject design. Care should be taken in interpreting differences because of these methodological dissimilarities.

Secondly, in this study both behavioural measures (subjects willingness to participate in the unrewarded session) and self-report measure (intrinsic motivation/perceived task interest) combined are the obvious indicators for assessing intrinsic motivation. while Deci's study centres around his use of vigilance as a measure of intrinsic motivation. This may have been an important methodological variation that lead to the different results between the present study and Deci's findings.

Last but not least, care should be taken in generalizing sex differences from this study because of the small cell size.

Chapter 7
SUMMARY and CONCLUSION

Summary of the research design and results

The research was performed in a laboratory setting. The experimental treatments involved three independent variables. Allocation of reward and magnitude of reward arranged in 3 x 2 x 2 design, sex differences was also involved as the independent variable. One independent variable contrasted three types of monetary rewards : task-noncontingent reward, task-contingent reward and performance-contingent reward. The second independent variable contrasted sizes of reward : $5.00 (30 minutes participation and above average groups), $1.70 (10 minutes participation and below average groups) and 8 cents per problem solved (in 30 minutes and in 10 minutes groups).

Subjects were randomly assigned to one of the six experimental conditions. The task was a Mechanical Reasoning Test which consisted of 68 items. Subjects were given a period of 30 minutes or 10 minutes, built upon which experimental condition the subject was randomly assigned. Then the subjects were asked to complete the semantic differential scale My Task and Perceived Task Competence, as well as a behavioural measure of intrinsic motivation.

The purpose of the study was to examine the possible interactive effects of allocation of reward and magnitude of reward upon intrinsic motivation/task interest and perceived competence.

In an attempt to resolve this, five hypotheses based on the predictions of cognitive evaluation theory (Deci, 1975) were proposed and tested. A 3 x 2 x 2 factorial design was conducted to consider the effects of the experimental treatments (see appendix for results). Comparisons were made between the six experimental conditions and between males and females. Monetary reward was found to have a detrimental effect on intrinsic motivation/task interest and perceived task competence, with most of the significant decreases observed in condition six ($1.70/below average groups). A significant relation was not found between intrinsic motivation/task interest and perceived task competence. This was expected for task-noncontingent reward and task-contingent reward but not for performance-contingent reward.

These findings indicated partial support for Deci's cognitive evaluation theory.

Limitations of present study

In recruiting subjects to participate, information provided about the topic of this study was probably too specific to avoid merely conveying a vague notion of its nature. On the contrary, it was likely the subjects were aware of some of the aims thereby accounting for the present results.

The study did not consider the participation of subjects who were highly intrinsically motivated. This alone may have influenced the results.

Since the task involved was an aptitude test, this may also have influenced the present results.

Implications and Conclusion

Generalizing from the present results, it can be argued that industrial work organization may not provide settings in which there should theoretically be any inhibitory effects of intrinsic motivation. Industrial work settings constitute non-voluntary organizations in which most participants have a utilitarian orientation. An exchange relationship is socially recognized in which work is provided for salary and other extrinsic rewards.

The present results of the interactive effects of allocation of reward and magnitude of reward on task interest/intrinsic motivation and perceived task competence were only generalizable for psychology stage 2 laboratory students. The present results may suggest that the interactive effects would more likely be found in voluntary organizations, where individuals are not usually extrinsically motivated to perform. However, this is speculative since there have been no data specifically collected from voluntary organizations.

Still, the point of the discussion and implications of the present data lead one to conclude that money must be inappropriately administered in order for it to inhibit task interest/intrinsic motivation and perceived task competence, although care should be taken in constructing the research methodology to gain supportive data.

Future research should consider the limitations of this study in order to find more supportive data for cognitive evaluation theory.

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APPENDIX A

PARTICIPATION FORM

I am a thesis student and I am here to ask you for your participation in my study. My study is a study in the area of Motivation. Specifically, I will be looking at the effects of several types of reward contingencies on one facet of motivation. This study will be done individually and will take around 10 to 30 minutes of your time. If you agree to participate please fill in this form.

NAME Age: M/F
Telephone No.
On what time are you available during the day or if interested on weekend ??

Weekdays : **Monday----------**
Tuesday----------
Wednesday---------
Thursday----------
Friday----------

Weekend : **Saturday----------**

I really appreciate your participation and will contact you as soon as possible for your schedule..

Rina Sjoekri

APPENDIX B

INSTRUCTIONS

TASK-NONCONTINGENT REWARD/$5.00

Before we start with the study, I would like to thank you for your participation. My study is a study in the area of Motivation. Specifically, I will be looking at the effects of several types of reward contingencies on one facet of motivation. You need not doubt the confidentiality of this study, your name will not be used in any way.

In this study you will be given a test called the Mechanical Reasoning Test. This test consists of 68 items, each item consists of a number of pictures and subsequently questions about those pictures. Look at Example X on this page as a guide. Example X shows a picture of two men carrying a machine part on a board and asks, "Which man has the heavier load ? If equal, mark C". Man 'B' has the heavier load because the weight is closer to him than to man 'A'. Mark your answers on a separate sheet, on the space under B.

You will be given a period of 30 minutes to complete as many items as you can. There will be a reward for your participation in this study where you will receive $5.00 at the end of this test. Any question ?? You may begin.

AFTER COMPLETING THE TEST

Now that you have completed the test, you get $5.00 for your participation. But before you leave the room I would like you to complete two questionnaires with relation to the task. Thank you very much for your cooperation.

TASK-NONCONTINGENT REWARD/$1.70

Before we start with the study, I would like to thank you for your participation. My study is a study in the area of Motivation. Specifically, I will be looking at the effects of several types of reward contingencies on one facet of motivation. You need not doubt the confidentiality of this study, your name will not be used in any way.

In this study you will be given a test called the Mechanical Reasoning Test. This test consists of 68 items, each item consists of a number of pictures and subsequently questions about those pictures. Look at Example X on this page as a guide. Example X shows a picture of two men carrying a machine part on a board and asks, "Which man has the heavier load ? If equal, mark C". Man 'B' has the heavier load because the weight is closer to him than to man 'A'. Mark your answers on a separate sheet, on the space under B.

You will be given a period of 10 minutes to complete as many items as you can. There will be a reward for your participation in this study where you will receive $1.70 at the end of this test. Any question ?? You may begin.

AFTER COMPLETING THE TEST

Now that you have completed the test on a given period of time, you get $1.70 for your participation. But before you leave the room I would like you to complete two questionnaires with relation to the task. Thank you very much for your cooperation.

TASK-CONTINGENT REWARD/8 CENTS PER PROBLEM(30 minutes)

Before we start with the study, I would like to thank you for your participation. My study is a study in the area of Motivation. Specifically, I will be looking at the effects of several types of reward contingencies on one facet of motivation. You need not doubt the confidentiality of this study, your name will not be used in any way.

In this study you will be given a test called the Mechanical Reasoning Test. This test consists of 68 items, each item consists of a number of pictures and subsequently questions about those pictures. Look at Example X on this page as a guide. Example X shows a picture of two men carrying a machine part on a board and asks, "Which man has the heavier load ? If equal, mark C". Man 'B' has the heavier load because the weight is closer to him than to man 'A'. Mark your answers on a separate sheet, on the space under B.

You will be given a period of 30 minutes to complete as many items as you can. There will be a reward for your participation in this study which is 8 cents for every problem that you attempted to solve successfully. Any question ?? You may begin.

AFTER COMPLETING THE TEST

Now that you have completed the test, you get $.....for.....problems that you have solved successfully. But before you leave the room I would like you to complete two questionnaires with relation to the task. Thank you very much for your cooperation.

TASK-CONTINGENT REWARD/8 CENTS PER PROBLEM (10 minutes)

Before we start with the study, I would like to thank you for your participation. My study is a study in the area of Motivation. Specifically, I will be looking at the effects of several types of reward contingencies on one facet of motivation. You need not doubt the confidentiality of this study, your name will not be used in any way.

In this study you will be given a test called the Mechanical Reasoning Test. This test consists of 68 items, each item consists of a number of pictures and subsequently questions about those pictures. Look at Example X on this page as a guide. Example X shows a picture of two men carrying a machine part on a board and asks, "Which man has the heavier load ? If equal, mark C". Man 'B' has the heavier load because the weight is closer to him than to man 'A'. Mark your answers on a separate sheet, on the space under B.

You will be given a period of 10 minutes to complete as many items as you can. There will be a reward for your participation in this study which is 8 cents for every problem that you attempted to solve successfully. Any question ?? You may begin.

AFTER COMPLETING THE TEST

Now that you have completed the test, you get $.....for.....problems that you have solved successfully. But before you leave the room I would like you to complete two questionnaires with relation to the task. Thank you very much for your cooperation.

PERFORMANCE-CONTINGENT REWARD/$5.00 (ABOVE AVERAGE)

Before we start with the study, I would like to thank you for your participation. My study is a study in the area of Motivation. Specifically, I will be looking at the effects of several types of reward contingencies on one facet of motivation. You need not doubt the confidentiality of this study, your name will not be used in any way.

In this study you will be given a test called the Mechanical Reasoning Test. This test consists of 68 items, each item consists of a number of pictures and subsequently questions about those pictures. Look at Example X on this page as a guide. Example X shows a picture of two men carrying a machine part on a board and asks, "Which man has the heavier load ? If equal, mark C". Man 'B' has the heavier load because the weight is closer to him than to man 'A'. Mark your answers on a separate sheet, on the space under B.

You will be given a period of 30 minutes to complete as many items as you can. There will be a reward for your participation in this study, depending on how well you perform. You will get $5.00 if you perform above average of the other participants, or $1.70 if you perform below average. Any question ?? You may begin.

AFTER COMPLETING THE TEST

Now that you have completed the test, you get $ 5.00 since you have performed above average. But before you leave the room I would like you to complete two questionnaires with relation to the task. Thank you very much for your cooperation.

PERFORMANCE-CONTINGENT REWARD/$1.70 (BELOW AVERAGE)

Before we start with the study, I would like to thank you for your participation. My study is a study in the area of Motivation. Specifically, I will be looking at the effects of several types of reward contingencies on one facet of motivation. You need not doubt the confidentiality of this study, your name will not be used in any way.

In this study you will be given a test called the Mechanical Reasoning Test. This test consists of 68 items, each item consists of a number of pictures and subsequently questions about those pictures. Look at Example X on this page as a guide. Example X shows a picture of two men carrying a machine part on a board and asks, "Which man has the heavier load ? If equal, mark C". Man 'B' has the heavier load because the weight is closer to him than to man 'A'. Mark your answers on a separate sheet, on the space under B.

You will be given a period of 10 minutes to complete as many items as you can. There will be a reward for your participation in this study, depending on how well you perform. You will get $5.00 if you perform above average of the other participants, or $1.70 if you perform below average. Any question ?? You may begin.

AFTER COMPLETING THE TEST

Now that you have completed the test, you get $1.70 since you have performed below average. But before you leave the room I would like you to complete two questionnaires with relation to the task. Thank you very much for your cooperation.

THE PSYCHOLOGICAL CORPORATION

Ψ

DIFFERENTIAL APTITUDE TESTS

George K. Bennett
Harold G. Seashore
Alexander G. Wesman

APPENDIX C

MECHANICAL REASONING

FORM A

Do not open this booklet until you are told to do so.

On your SEPARATE ANSWER SHEET, print your name, address, and other requested information in the proper spaces.

In the space after **Form**, print an **A**.

Then wait for further instructions.

DO NOT MAKE ANY MARKS IN THIS BOOKLET

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Reg. U.S. Pat. Off.

57-229 TB

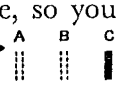
Do not make any marks in this booklet

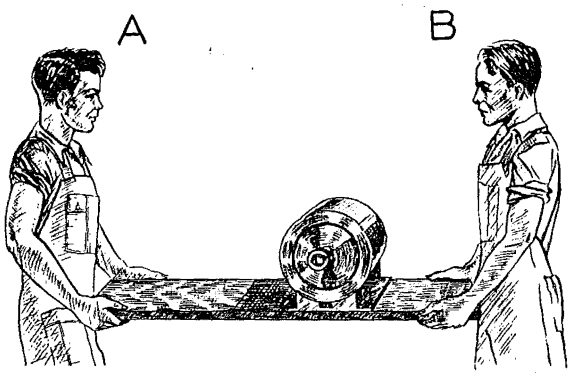
Mark your answers on the separate Answer Sheet

MECHANICAL REASONING

DIRECTIONS

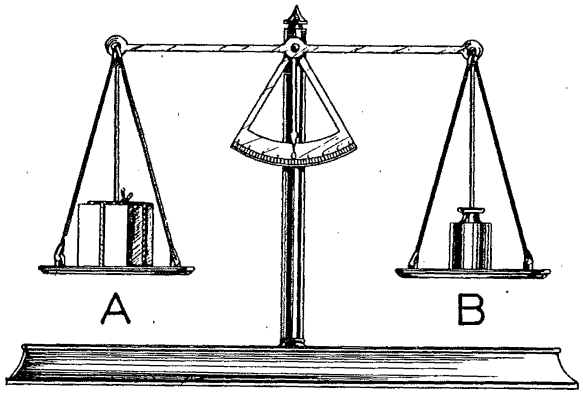
This test consists of a number of pictures and questions about those pictures. Look at Example X on this page to see just what to do. Example X shows a picture of two men carrying a machine part on a board and asks, "Which man has the heavier load? If equal, mark C." Man "B" has the heavier load because the weight is closer to him than to man "A," so on the separate Answer Sheet you would fill in the space under B, like this → 

Now look at Example Y. The question asks, "Which weighs more? If equal, mark C." As the scale is perfectly balanced, "A" and "B" must weigh the same, so you would blacken the space under C on your separate Answer Sheet, like this → 



X

Which man has the heavier load?
(If equal, mark C.)



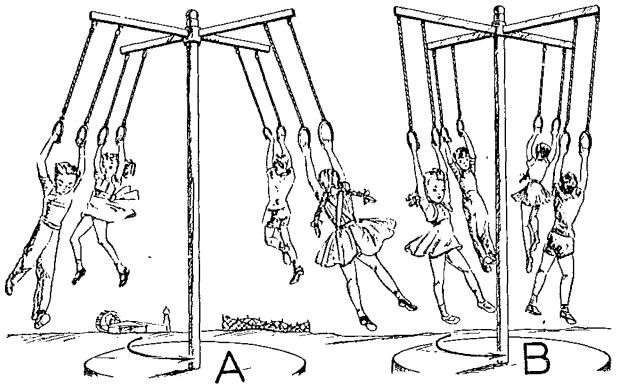
Y

Which weighs more?
(If equal, mark C.)

On the following pages there are more pictures and questions. Read each question carefully, look at the picture, and mark your answer on the separate Answer Sheet. Do not forget that there is a third choice for every question.

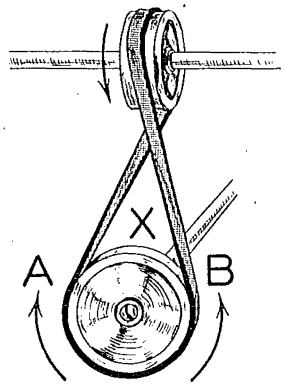
DO NOT TURN OVER THE BOOKLET UNTIL YOU ARE TOLD TO DO SO.

Drawings by Helen Gabryel



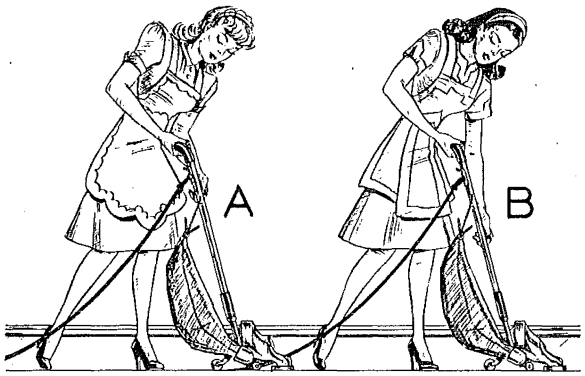
1

In which picture are the children whirling faster?
(If equal, mark C.)



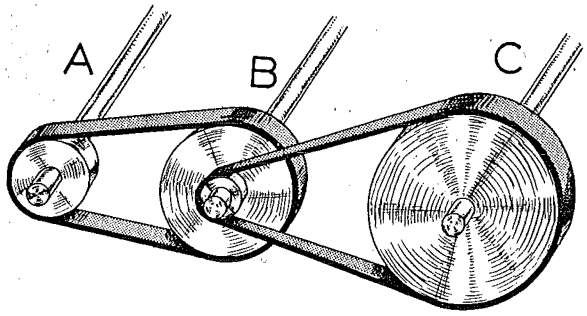
2

When the top pulley turns in the direction shown, which way will the lower pulley turn?
(If either, mark C.)



3

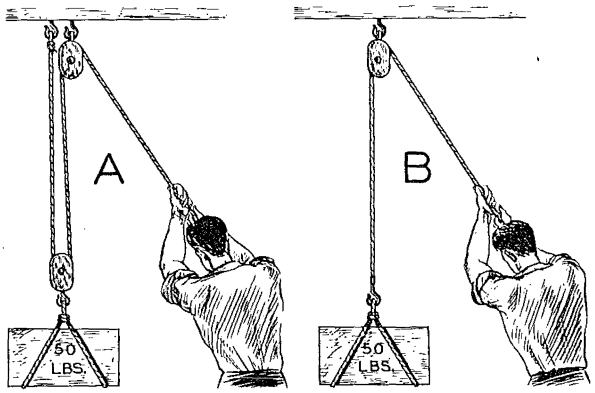
Which girl can lift the cleaner more easily?
(If equal, mark C.)



4

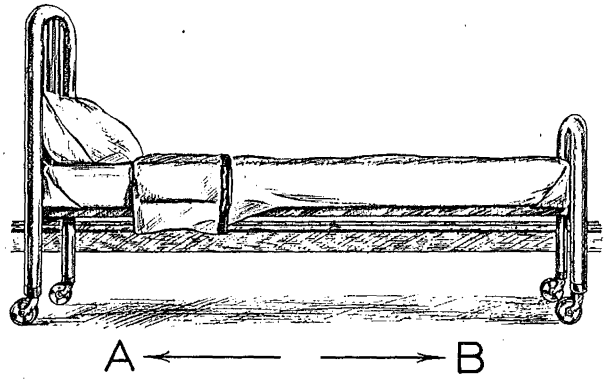
Which shaft will turn most slowly?

Do Not Stop. Go On to the Next Page.



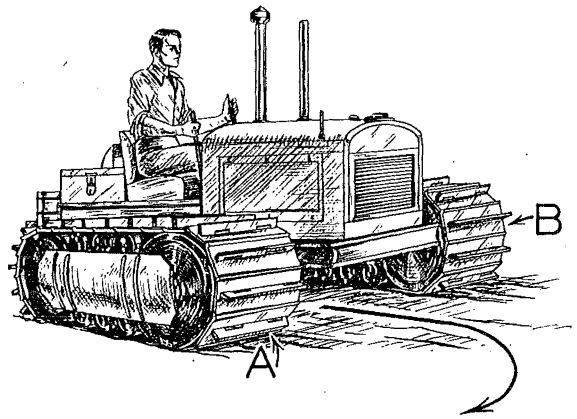
5

Which man must pull harder to lift the weight?
(If equal, mark C.)



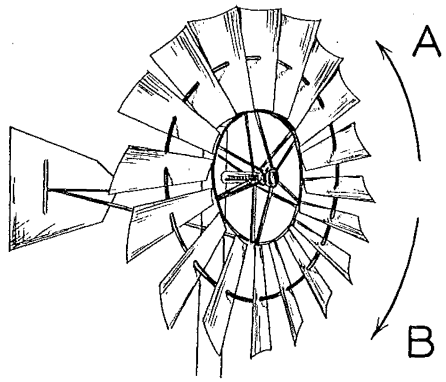
6

Which way has this bed just been rolled?
(If either, mark C.)



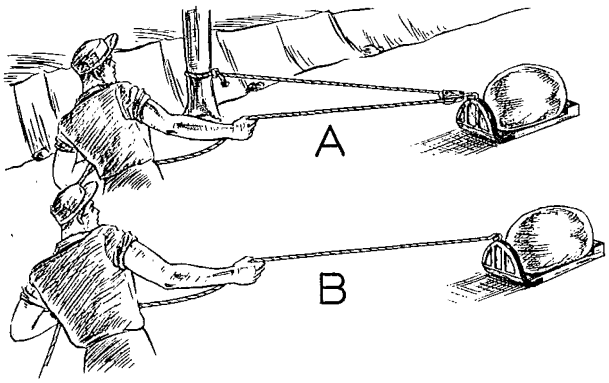
7

Which tread should move more slowly for the tractor to turn in the direction shown?
(If neither, mark C.)



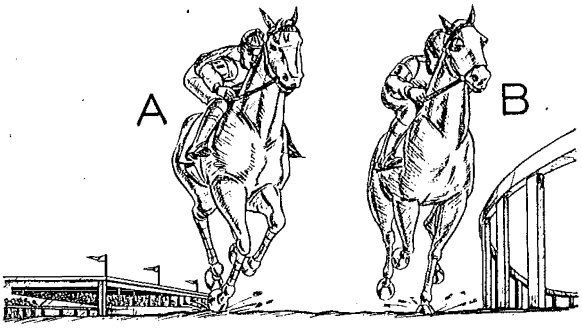
8

In which direction is this windmill more likely to turn?
(If either, mark C.)



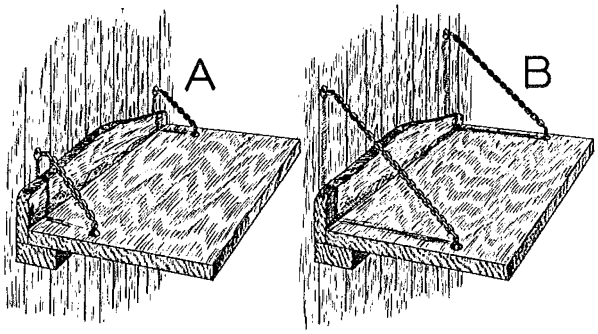
9

Which man has to pull harder?
(If equal, mark C.)



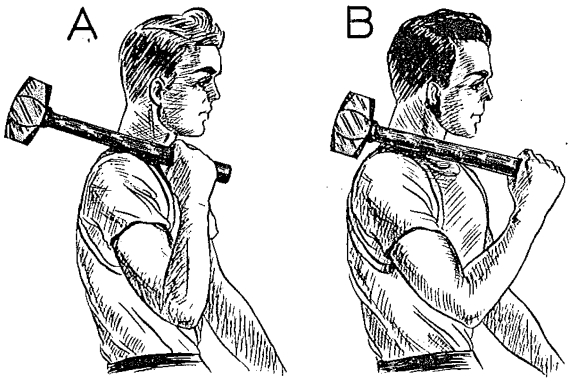
10

Which horse must go faster to hold his place on the turn?
(If equal, mark C.)



11

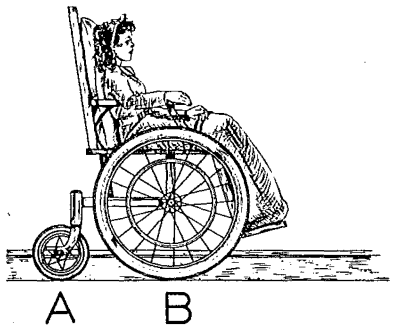
Which shelf is stronger?
(If equal, mark C.)



12

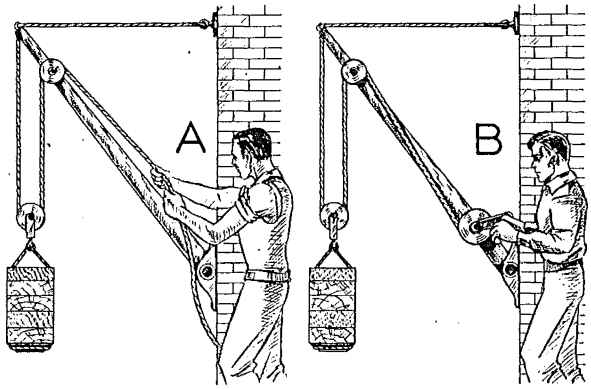
Which is the harder way to carry the hammer?
(If equal, mark C.)

Do Not Stop. Go On to the Next Page.



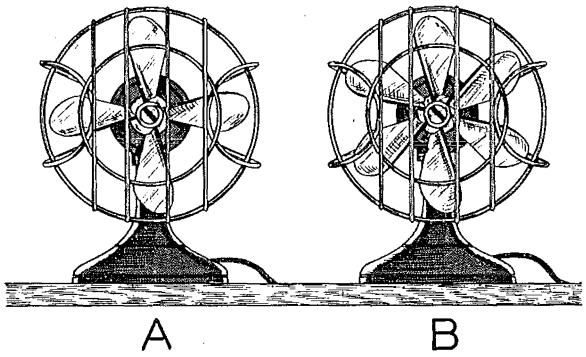
13

Which wheel will turn faster?
(If equal, mark C.)



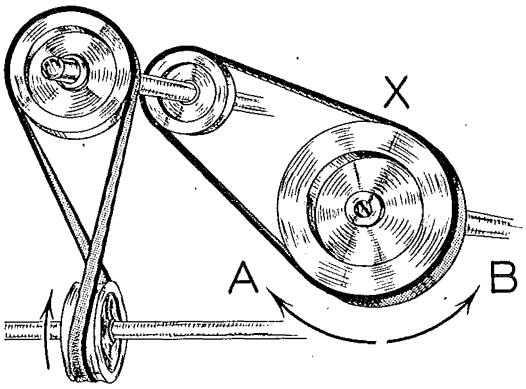
14

Which man can lift the weight more easily?
(If equal, mark C.)



15

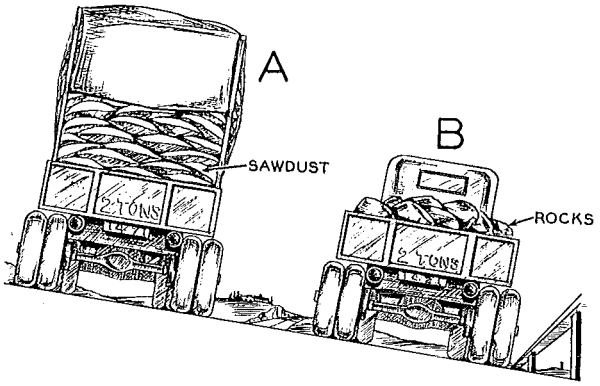
Which fan needs the more powerful motor?
(If equal, mark C.)



16

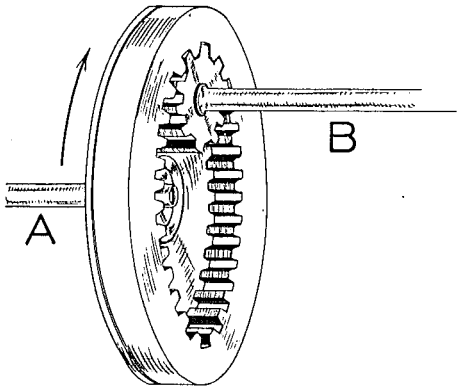
Which way will pulley "X" turn?
(If either, mark C.)

Do Not Stop. Go On to the Next Page.



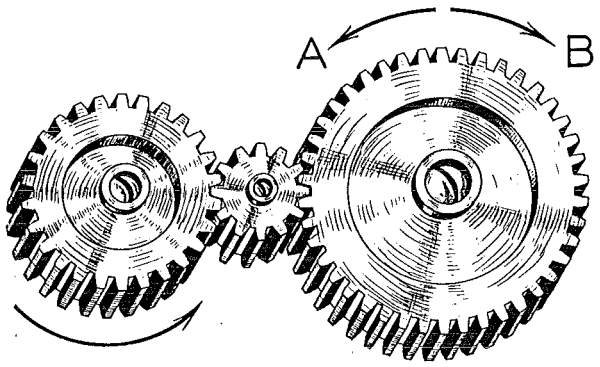
17

Which truck will turn over more easily?
(If equal, mark C.)



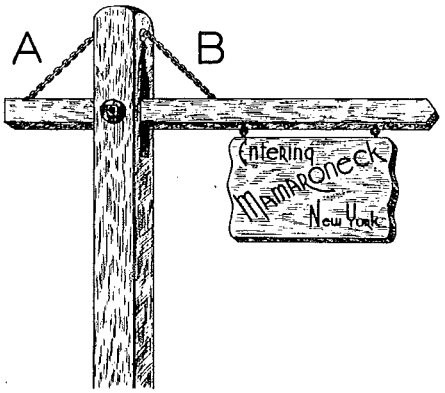
18

Which shaft turns faster?
(If equal, mark C.)



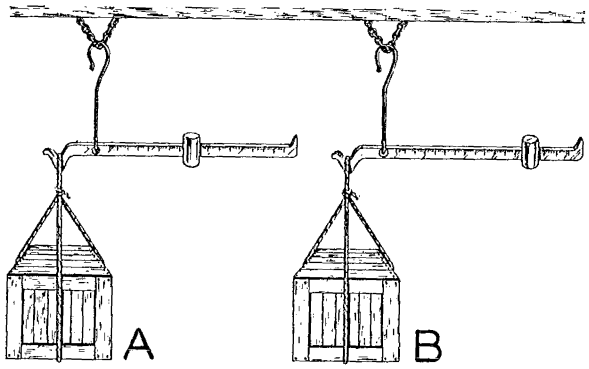
19

When the left-hand gear turns in the direction shown, which way does the right-hand one turn?
(If either, mark C.)



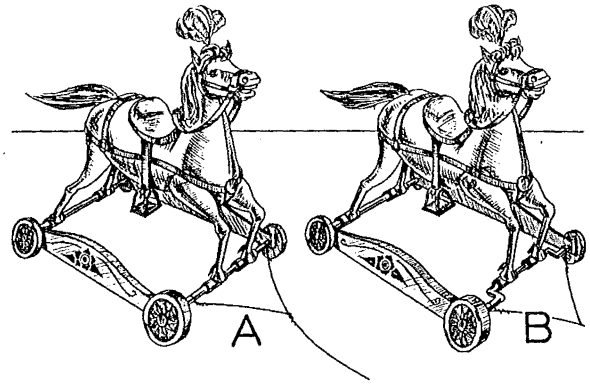
20

Which chain alone will hold up the sign?
(If either, mark C.)



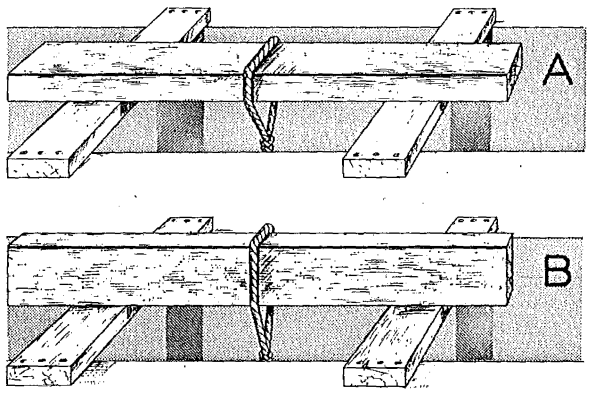
21

Which box weighs more?
(If equal, mark C.)



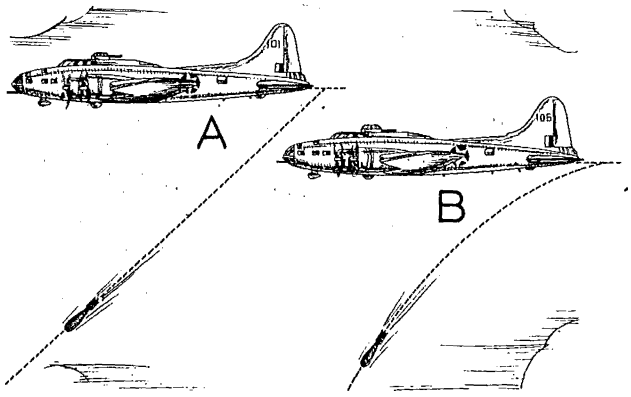
22

Which horse will jump more when it is pulled?
(If equal, mark C.)



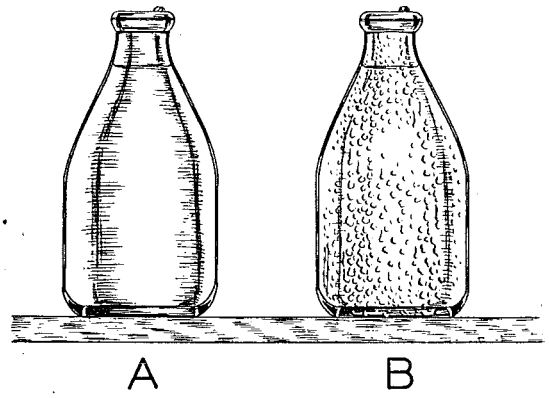
23

In which picture can you safely put a heavier weight on the rope?
(If equal, mark C.)



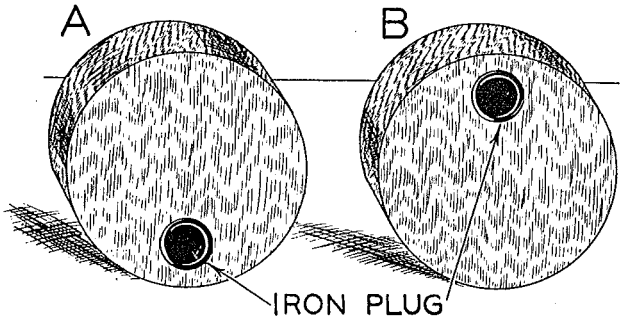
24

Which drawing shows how a bomb really falls?
(If both, mark C.)



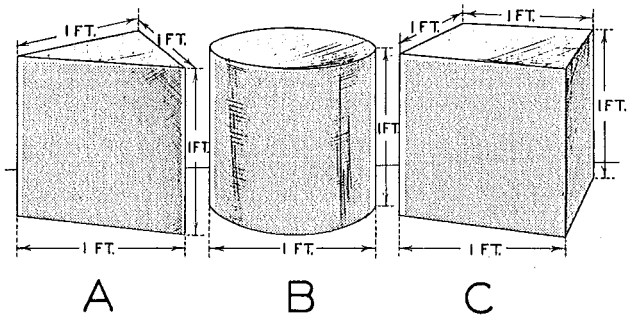
25

Which bottle has just been taken from the refrigerator?
(If neither, mark C.)



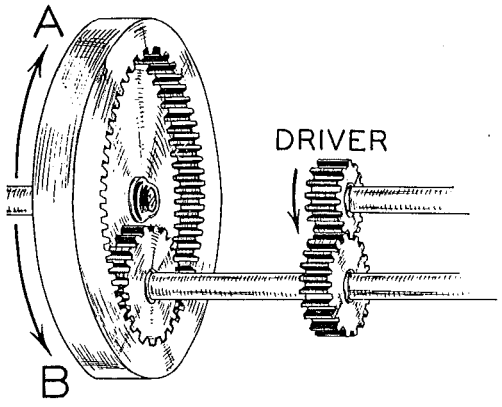
26

Which picture shows how this wooden circle will stand?
(If neither, mark C.)



27

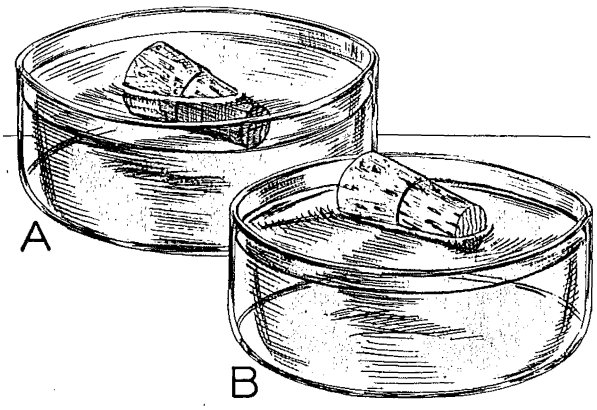
Which weighs least?



28

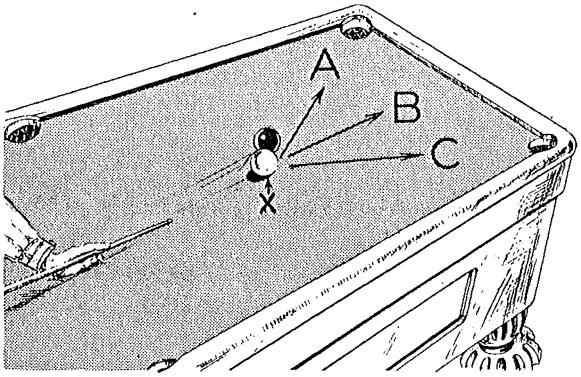
When the driver turns in the direction shown, which way will the left-hand gear turn?
(If either, mark C.)

Do Not Stop. Go On to the Next Page.



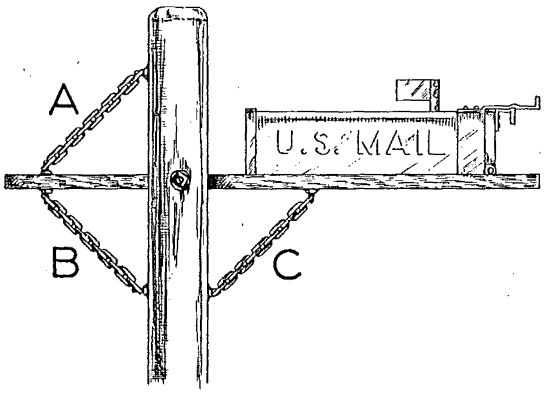
29

Which liquid is heavier?
(If equal, mark C.)



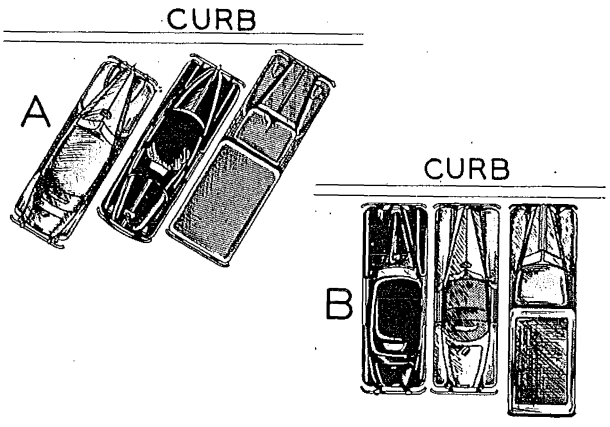
30

After hitting the black ball, which way will ball "X" go?



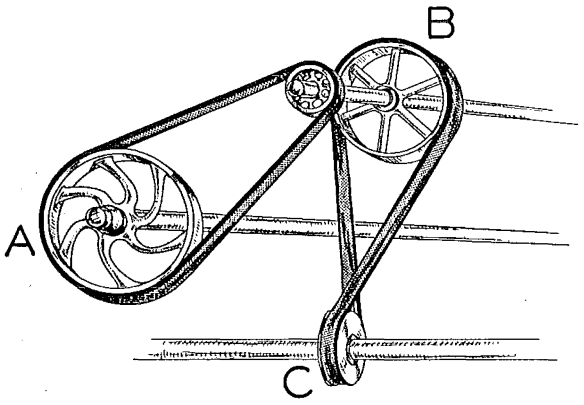
31

Which one piece of chain is needed to support the mail box?



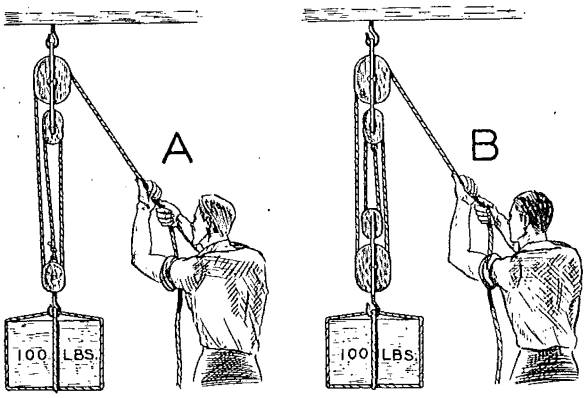
32

Which way can more cars be parked in a block?
(If equal, mark C.)



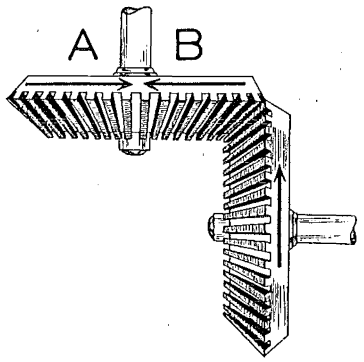
33

Which shaft will turn most rapidly?



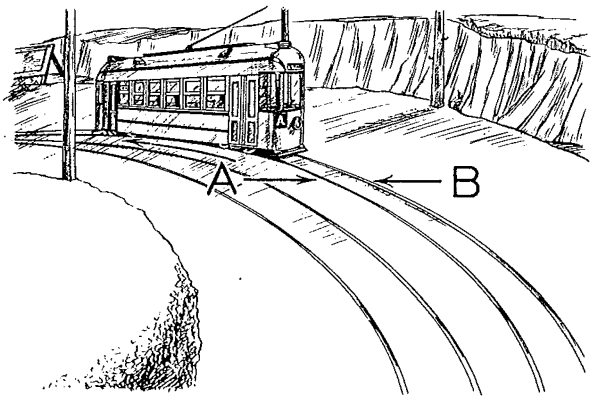
34

Which man can lift the load more easily?
(If equal, mark C.)



35

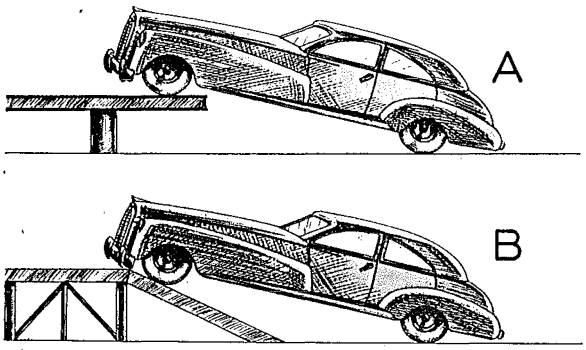
When the right-hand gear turns in the direction shown, which way does the top gear turn?
(If neither, mark C.)



36

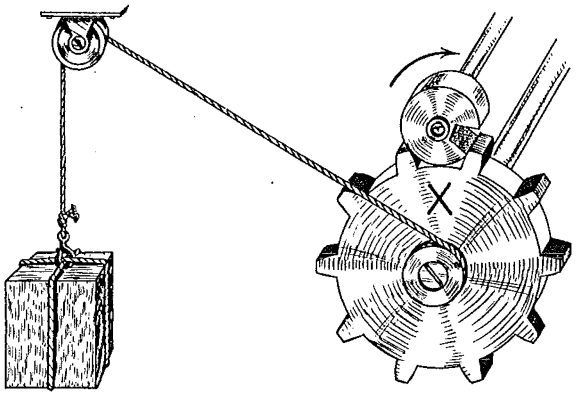
Which rail should be higher?
(If equal, mark C.)

Do Not Stop. Go On to the Next Page.



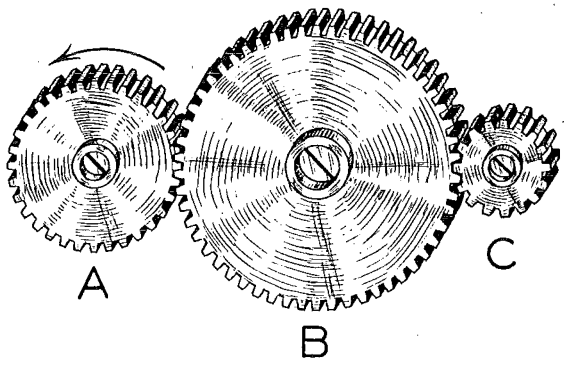
37

Which car is less likely to roll?
(If equal, mark C.)



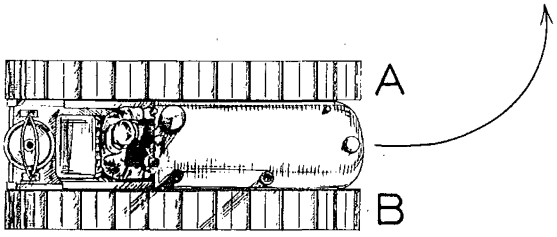
38

The top of wheel "X" will go:
(A) steadily to the right;
(B) steadily to the left;
(C) by jerks to the left.



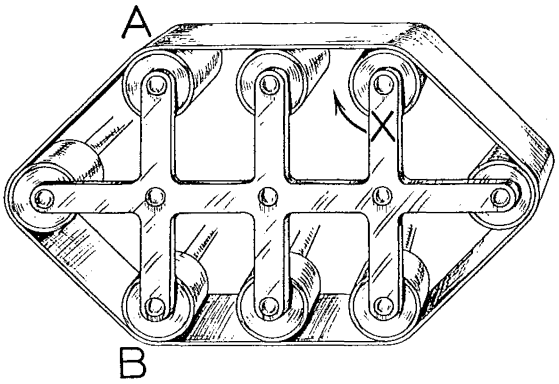
39

Which gear turns most times in a minute?



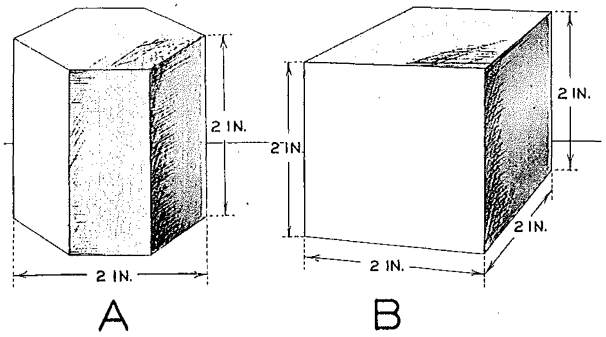
40

Which tread should be run more rapidly in order to turn the tractor in the direction shown?
(If neither, mark C.)



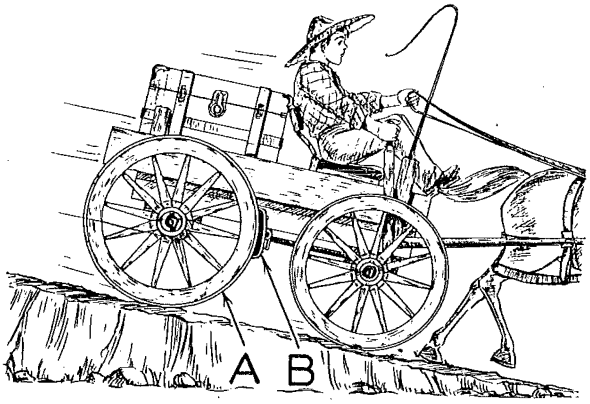
41

Which roller turns the same way as the roller at "X"?
(If both, mark C.)



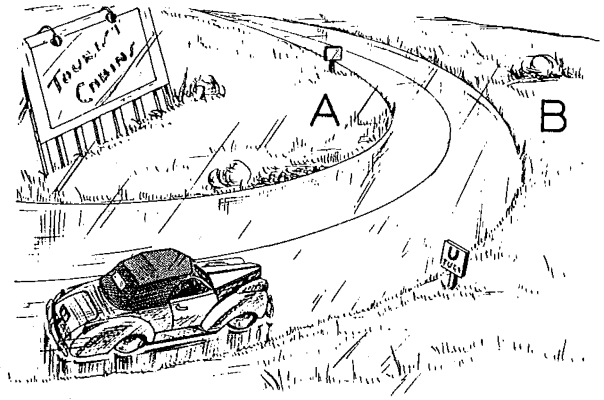
42

Which weighs more?
(If equal, mark C.)



43

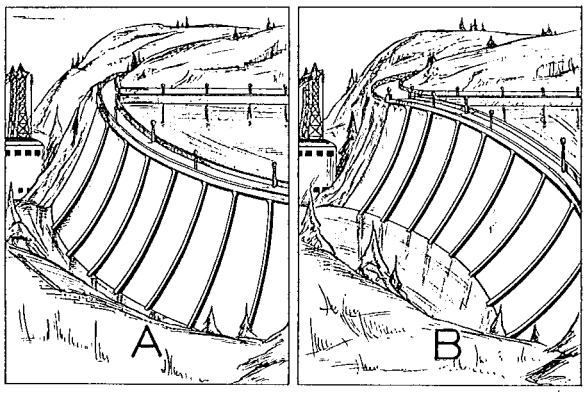
When the brake is put on, which part gets hotter?
(If equal, mark C.)



44

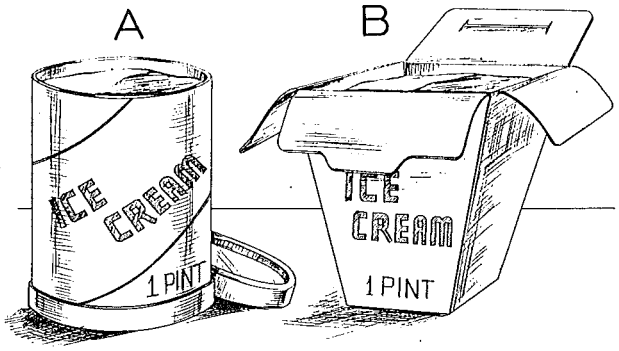
Off which side of the road is the car more likely to skid?
(If equal, mark C.)

Do Not Stop. Go On to the Next Page.



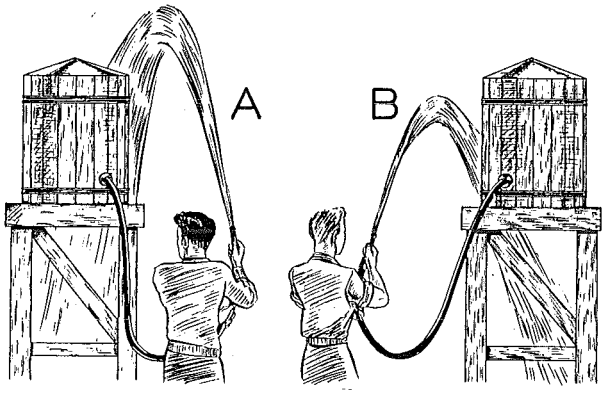
45

Which dam is stronger?
(If equal, mark C.)



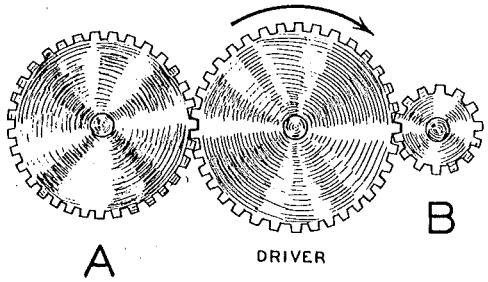
46

In which container will the ice cream stay hard longer?
(If equal, mark C.)



47

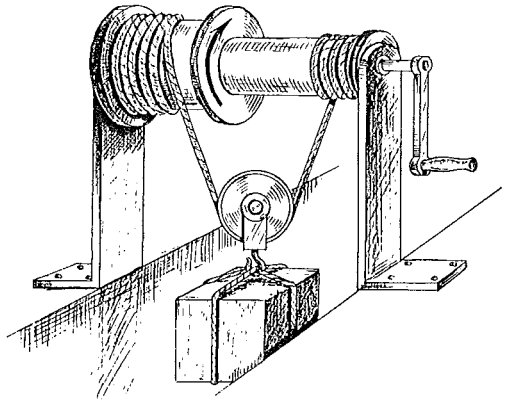
Which picture is correct?
(If both, mark C.)



48

Which gear turns the same way as the driver?
(If neither, mark C.)

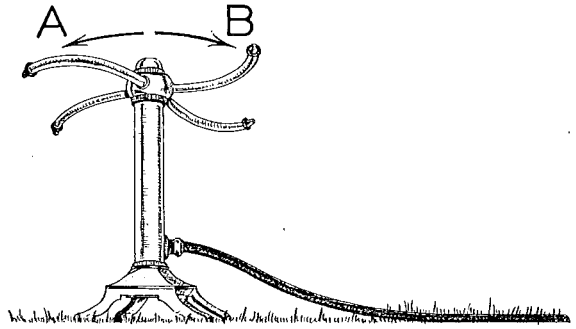
Do Not Stop. Go On to the Next Page.



49

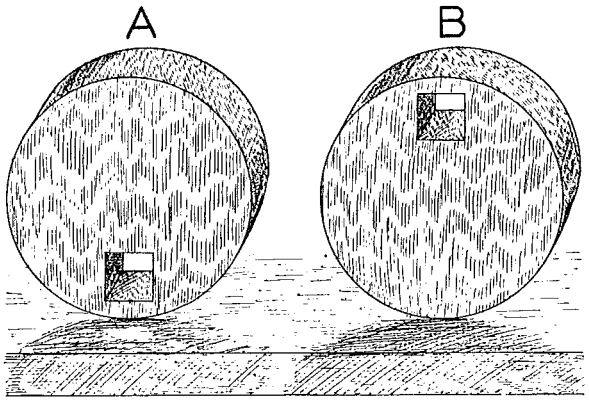
When the windlass is turned in the direction shown, the weight will:

(A) fall;
(B) stand still;
(C) rise.



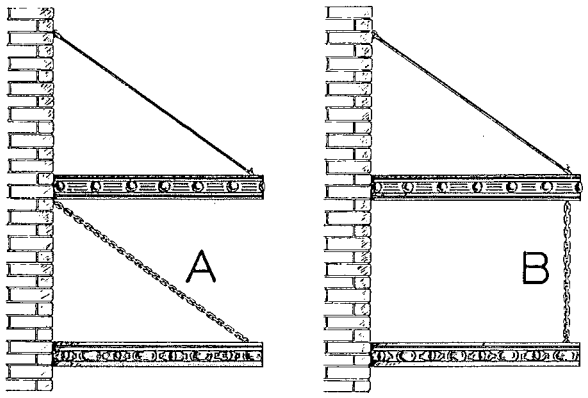
50

When the water is turned on, which way will the sprinkler turn?
(If either, mark C.)



51

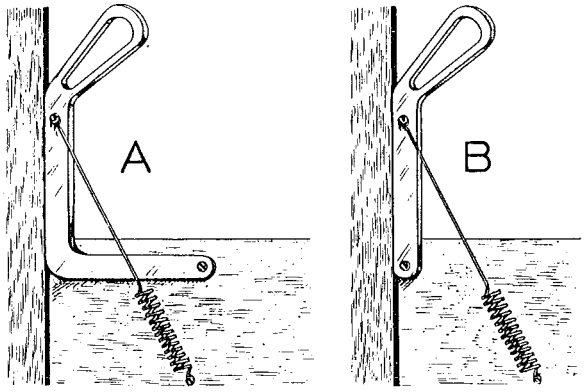
Which picture shows how this wooden circle will stand?
(If neither, mark C.)



52

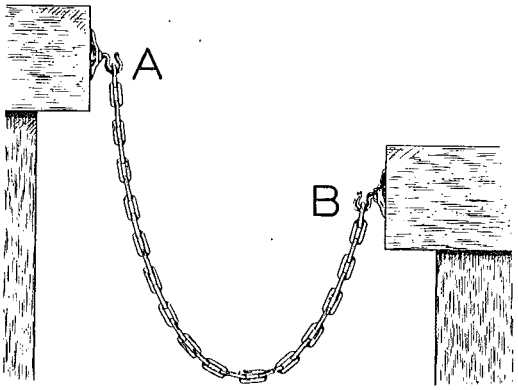
Which chain has more strain upon it?
(If equal, mark C.)

Do Not Stop. Go On to the Next Page.



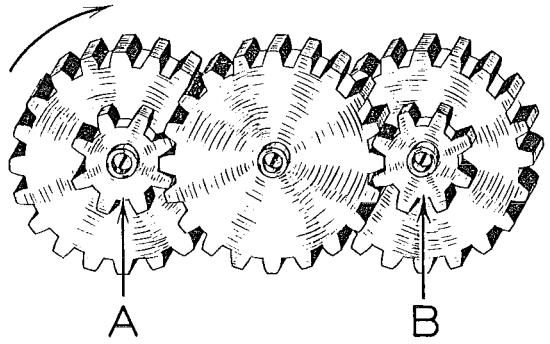
53

In which picture will the spring hold the handle where it now is?
(If both, mark C.)



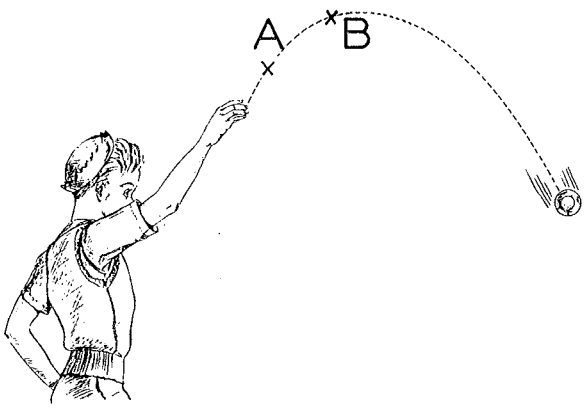
54

Which hook supports more weight?
(If equal, mark C.)



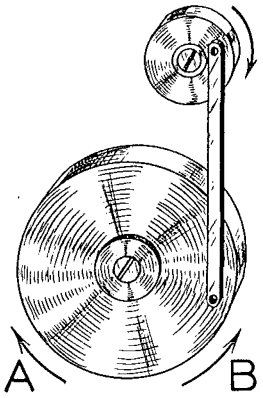
55

Which gear turns slower?
(If equal, mark C.)



56

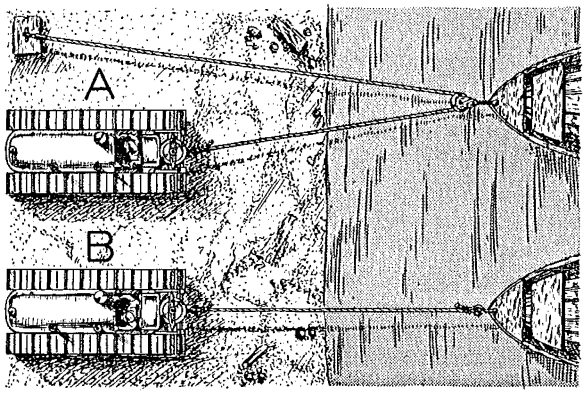
At which point was the ball going faster?
(If equal, mark C.)



57

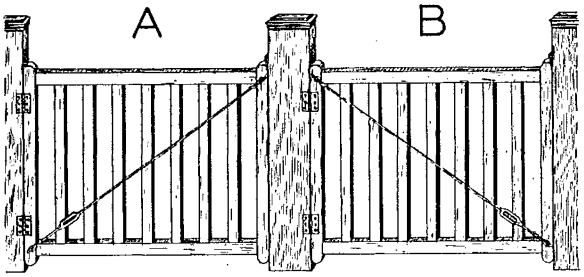
When the small wheel is turned around, the big wheel will:

(A) turn in direction A;
(B) turn in direction B;
(C) move back and forth.



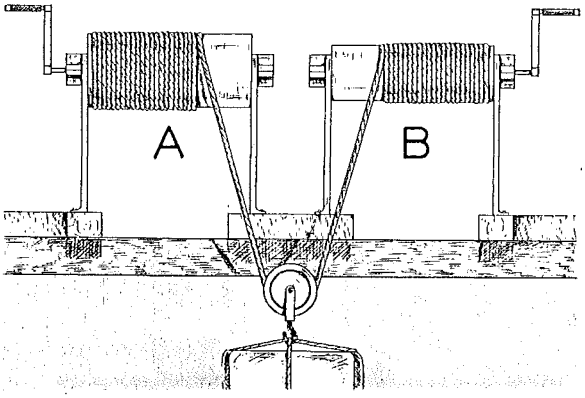
58

Which tractor must go further to pull the boat up on the beach? (If equal, mark C.)



59

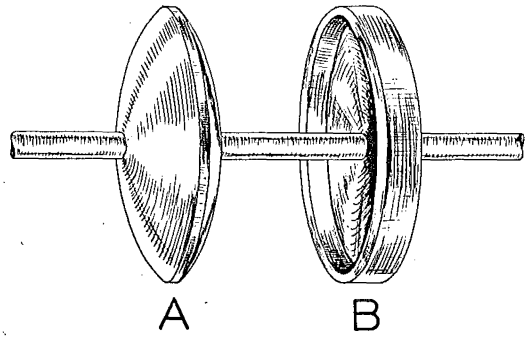
Which gate is better braced? (If equal, mark C.)



60

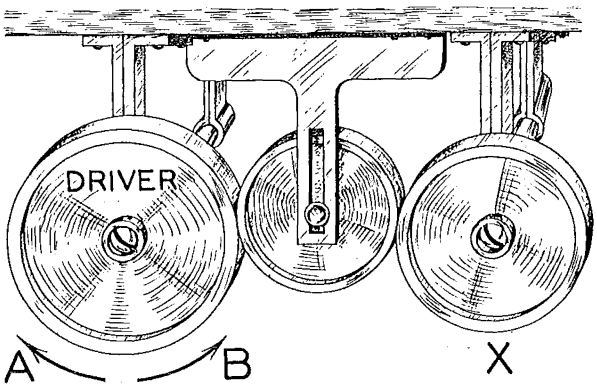
Which windlass will be harder to turn in order to lift the weight? (If equal, mark C.)

Do Not Stop. Go On to the Next Page.



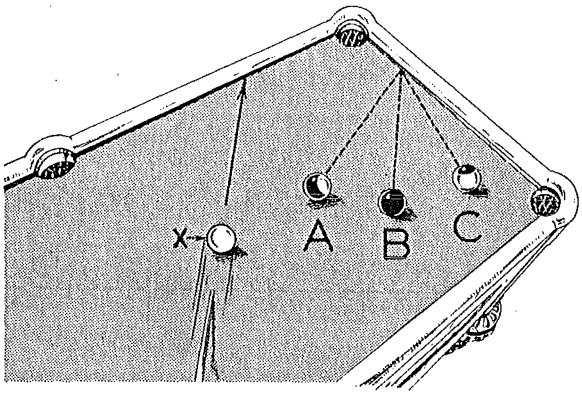
61

Which wheel is safer when spun at high speed?
(If equal, mark C.)



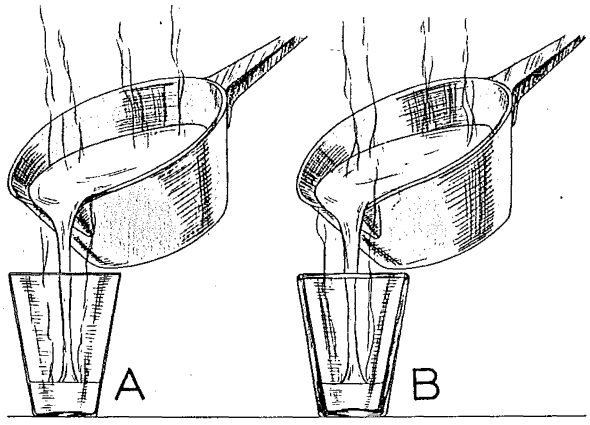
62

Which way must the driver turn to drive the wheel "X"?
(If either, mark C.)



63

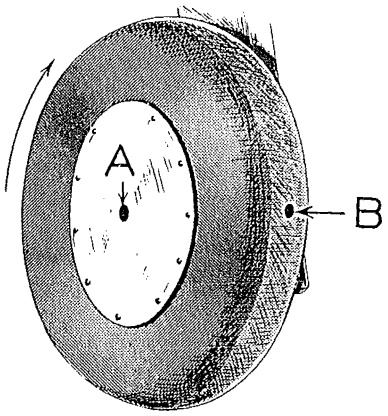
Which of these balls will the white ball "X" hit?



64

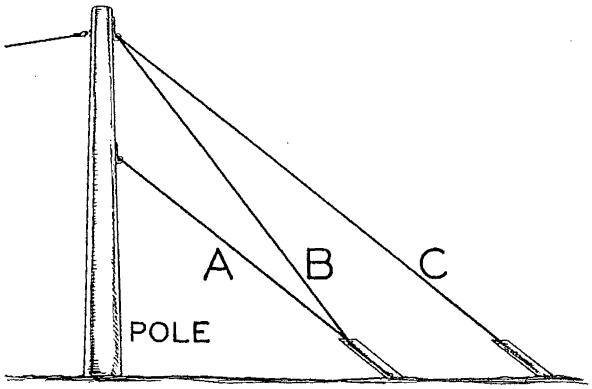
Which glass is more likely to break?
(If equal, mark C.)

Do Not Stop. Go On to the Next Page.



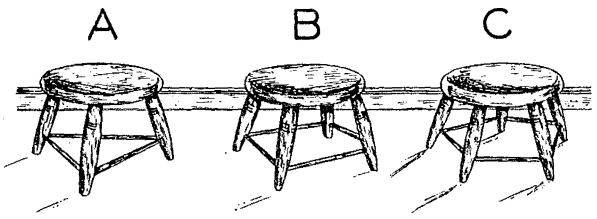
65

Which point moves faster when the wheel turns?
(If equal, mark C.)



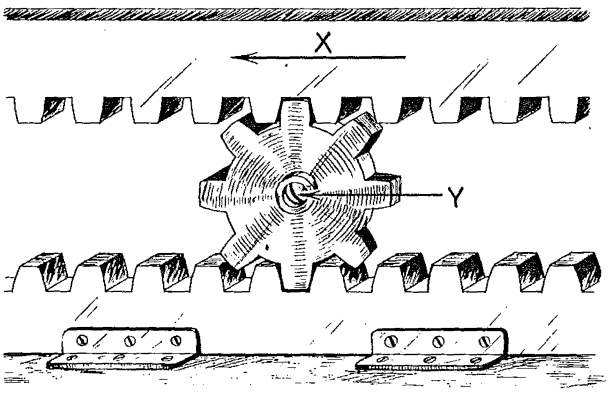
66

Which one piece of cable will give this pole the best support?



67

Which stool will be steadiest on uneven ground?



68

If "X" moves two feet in the direction shown, the center of the gear "Y" will move:

(A) more than two feet;
(B) less than two feet;
(C) two feet.

APPENDIX D

SEMANTIC DIFFERENTIAL SCALE "MY TASK"

SEX : M/F
AGE : yrs

Please indicate what you think about this task by placing a check mark along a line to indicate how each set of adjectives apply to the word.

1 = Extremely
2 = Quite
3 = Slightly
4 = Neither one nor the Other
5 = Slightly
6 = Quite
7 = Extremely

GOOD	1---2---3---4---5---6---7---	BAD
INTERESTING	1---2---3---4---5---6---7---	BORING
COMPLEX	1---2---3---4---5---6---7---	SIMPLE
PLEASANT	1---2---3---4---5---6---7---	UNPLEASANT
DIFFICULT	1---2---3---4---5---6---7---	EASY
STRUCTURED	1---2---3---4---5---6---7---	UNSTRUCTURED
ATTRACTIVE	1---2---3---4---5---6---7---	REPULSIVE
EXPLICIT	1---2---3---4---5---6---7---	VAGUE
CLEAR	1---2---3---4---5---6---7---	HAZY
MEANINGFUL	1---2---3---4---5---6---7---	MEANINGLESS
VARIED	1---2---3---4---5---6---7---	ROUTINE
TANGIBLE	1---2---3---4---5---6---7---	INTANGIBLE
POSITIVE	1---2---3---4---5---6---7---	NEGATIVE
BROAD	1---2---3---4---5---6---7---	NARROW
EXCITING	1---2---3---4---5---6---7---	DULL

APPENDIX E

SEMANTIC DIFFERENTIAL SCALE "PERCEIVED TASK COMPETENCE"

SEX : M/F
AGE : yrs

Please indicate your overall perceived competence toward the task by placing a check mark along a line to indicate how each set of adjectives apply to the word.

1 = Extremely
2 = Quite
3 = Slightly
4 = Neither one nor the Other
5 = Slightly
6 = Quite
7 = Extremely

STRONG	1---2---3---4---5---6---7---	WEAK
POSITIVE	1---2---3---4---5---6---7---	NEGATIVE
EFFECTIVE	1---2---3---4---5---6---7---	INEFFECTIVE
ORGANIZED	1---2---3---4---5---6---7---	UNORGANIZED
DECISIVE	1---2---3---4---5---6---7---	INDECISIVE
FAST	1---2---3---4---5---6---7---	SLOW
SUCCESSFUL	1---2---3---4---5---6---7---	UNSUCCESSFUL
CERTAIN	1---2---3---4---5---6---7---	UNCERTAIN
SKILLFUL	1---2---3---4---5---6---7---	BUNGLING
CAREFUL	1---2---3---4---5---6---7---	CARELESS

APPENDIX F

BEHAVIOURAL MEASURE

Thank you very much for your cooperation. I may want to ask for your participation in the near future to repeat the same exercise which you just did today. However, I shall not be able to compensate you for your efforts. In order to find out whether you are willing to return for another session, please answer the Question below.

Would you like to participate in this study if it were repeated again ? (Please check one). Give reasons for your answer.

----Yes **----No**

APPENDIX G
ANOVA RESULTS

Reward contingency (r) x size of reward (s) x sex differences (g): Intrinsic Motivation.

Source of Variation	df	Sum of squares	Mean square	F	P
r	2	1.425	.713	1.571	.2173
s	1	.780	.780	1.720	.1954
rs	2	3.307	1.654	3.646	.0328*
g	1	.001	.001	.001	.9735
rg	2	.118	.059	.130	.8785
sg	1	.022	.022	.048	.8270
rsg	2	.788	.394	.868	.4256
Error	53	24.038	.454		

*Significant at p<.05

Reward contingency (r) x Size of reward (s) x Sex differences (g): Perceived task competence

Source of Variation	df	Sum of Squares	Mean Square	F	P
r	2	7.780	3.890	6.678	.0026**
s	1	9.863	9.863	16.931	.0001**
rs	2	18.185	9.092	15.609	.0000**
g	1	6.129	6.129	10.522	.0020**
rg	2	.241	.120	.207	.8139
sg	1	.073	.073	.126	.7242
rsg	2	.799	.399	.686	.5082
Error	53	30.873	.583		

**Significant at p<.01